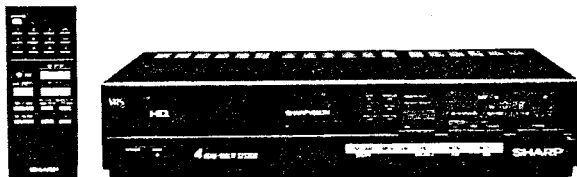


SHARP

SERVICE MANUAL

S7712VC-779Z/



VHS VIDEO CASSETTE RECORDER

MODEL VC-779Z

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

SPECIFICATIONS

Format:	VHS standard
Video recording system:	Four rotary head helical scan system
Video signal:	PAL: PAL System-B/G (P.B/REC)
	PAL: PAL System-I (P.B/REC)
	PAL: PAL System-D (P.B/REC)
	SECAM: MESECAM System (P.B/REC)
	SECAM: SECAM System-B/G (P.B/REC)
	SECAM: SECAM System-D/K (P.B/REC)
	NTSC: NTSC4.43 (P.B/REC)
	NTSC: NTSC3.58 (P.B/REC)
Recording/playing time:	240 min max. with SHARP E-240 tape (PAL/MESECAM/SECAM in SP mode)
	8 hours max. with SHARP E-240 tape (PAL/MESECAM/SECAM in LP mode)
	160 min max. with SHARP T-160 tape (NTSC in SP mode)
	8 hours max. with SHARP T-160 tape (NTSC in LP (EP) mode)
Tape width:	12.7 mm
Tape speed:	23.39 mm/sec. (PAL in SP mode) 33.34 mm/sec. (NTSC in SP mode)
	11.7mm/sec. (PAL in LP mode) 11.12mm/sec. (NTSC in LP (EP) mode)
Antenna:	75 ohm unbalanced
Receiving channel:	VHF CCIR I1 ~ S20
	UHF E21 ~ M83
RF converter output signal:	UHF channel E30 ~ E39 (adjustable). Preset to ch E36
Power requirement:	AC110 ~ 240V, AUTO 50/60Hz
Power consumption:	Approx. 33W (with anti-dew heater)
Operating temperature:	5°C to 40°C
Storage temperature:	-20°C to 55°C
Weight:	6.6 kg
Dimensions:	430 mm (W) x 354 mm (D) x 93 mm (H)
VIDEO	
Input:	1.0 Vp-p, 75 ohm
Output:	1.0 Vp-p, 75 ohm
AUDIO	0 dB = 0.775 Vrms
Input:	Line: -8 dB, more than 50 k ohm
Output:	Line: -5 dB, less than 1 k ohm
Accessories included:	Antenna 75 ohm coaxial connector cable (plug provided)
	Remote control unit
	OPERATION MANUAL

As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.
--

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169-2) for combined VHF/UHF antenna with 75 ohm connector.

REMOVAL OF MAIN PARTS

■ Printed Wiring Board Removal

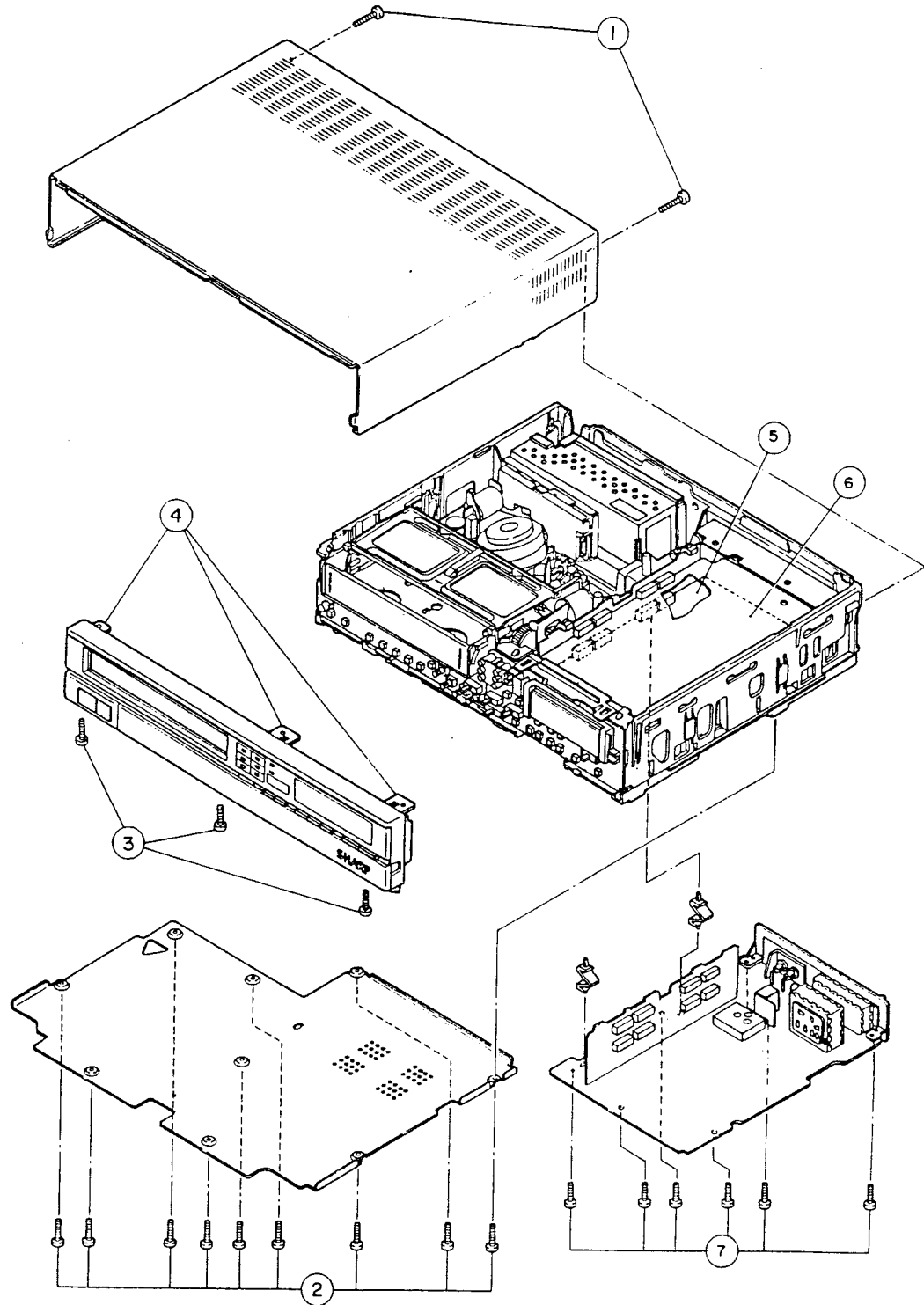


Figure 1-1.

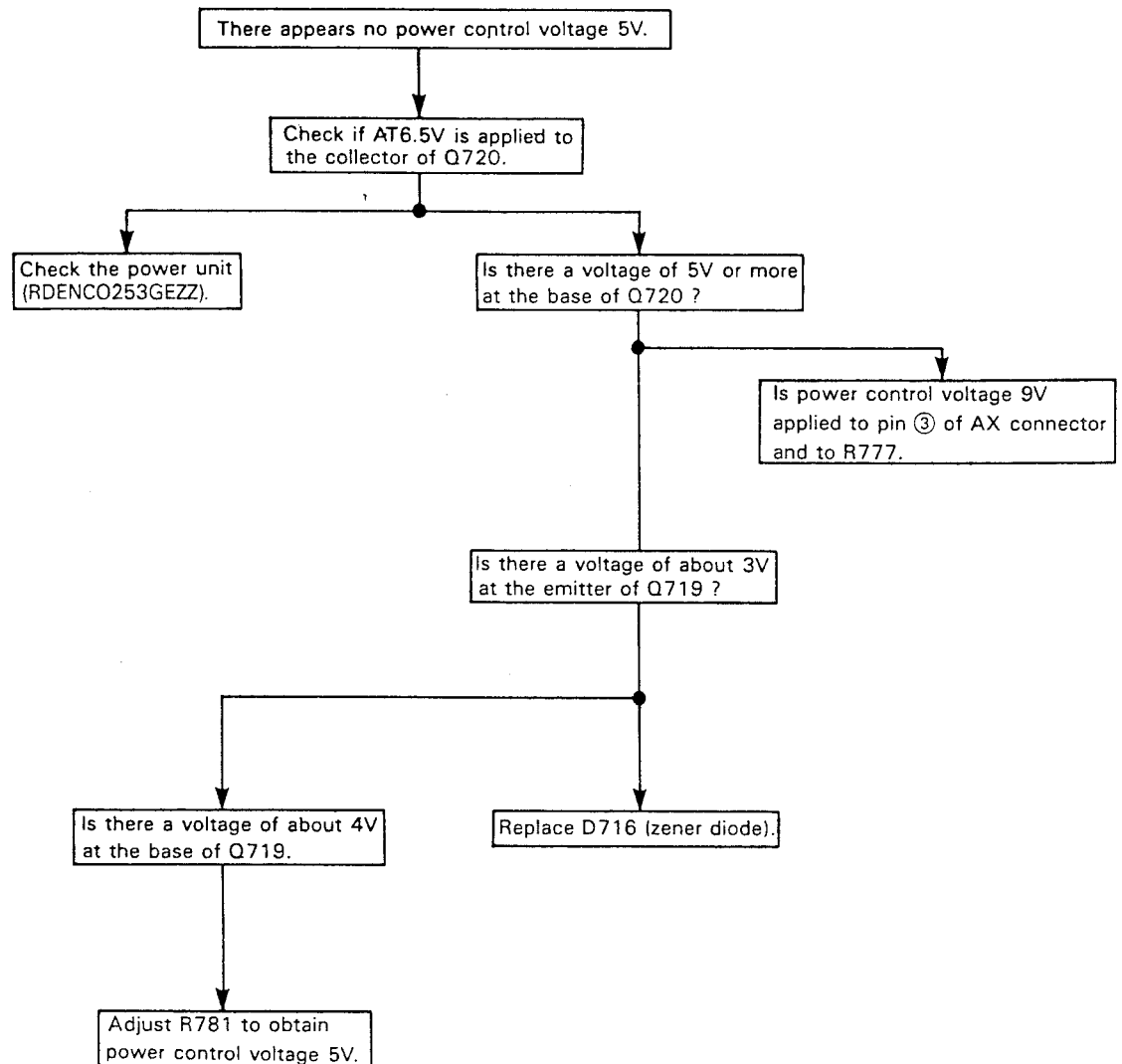
- ① Remove the two screws from the top cabinet.
- ② Remove the nine screws from the bottom plate.
- ③ Remove the three screws from the front panel.
- ④ Remove the three clips of the front panel and remove the front panel.
- ⑤ Remove the three screws from the syscon/servo PWB.
- ⑥ Remove the two screws from the YC/Audio PWB.
- ⑦ Remove the six screws from the main PWB.

TROUBLESHOOTING GUIDE

■ TROUBLES OF POWER UNIT

No.	Problems	Probable causes and countermeasures
1.	AT 15V output is not applied.	Check the following points: • See if F903 is broken. • See if L903 is broken. • See if D914 functions properly.
2.	AT 6.5V output is not applied.	Check the following points: • See if F902 is broken. • See if L904 is broken. • See if D915 functions properly.
3.	AT 45V output is not applied.	Check the following points: • See if R914 is broken. • See if D916 functions properly.
4.	AT -30V output is not applied.	Check the following points: • See if R911 broken. • See if L902 is broken. • See if Q902 and its peripheral parts function properly.
5.	No voltage is supplied along all the lines. (Complete power-off)	a) First check the above items 1 thru 4. b) Check to see if F901 is broken. c) See if ICP901 is broken. d) See if R902 is broken. e) See if F904 is broken. f) When no problem is found in the above steps a) thru e), check to see if the switching signal, as shown below, is given between pin ② and pin ④ of IC901.  If the signal is not given, replace the IC901 with a new one and check its peripheral parts (capacitors, resistors and diodes). Note: The primary (hot) circuit is switched on and off at high voltage. While checking, be very careful not to touch the circuit to keep off an electric shock.

■ Power control voltage 5V



■ TROUBLES OF CONTROL SYSTEM (SYSTEM CONTROLLER CIRCUIT)

No.	Problems	Probable causes and countermeasures
1.	No power is supplied.	- The fuse is blown out; check if there occurs a short-circuit in the internal circuit. - Check if there are produced AT5V, UR (un-regulated) 15V and AT12V in the power circuit; if not, this means that the power circuit is defective. - Check if the system controller (IC801) is normally functioning; check if there are produced reset signal at pin ⑨ of IC801 and clock signal at pin ⑪ of IC801. - Check if the power control signal (High) goes out of pin ⑫ of IC801.
2.	No operation is available.	- Check if the start sensor signal and end sensor signal are applied to pin ⑮ and pin ⑰ of IC801 respectively. - Check if the unit is in timer mode. - Check if the unit is in sensor stop mode. - The cam switch is poorly adjusted for its positioning. - Check if the key input voltage is as specified.
3.	After tape loading, the unit is stopped with the tape kept wound over the drum, or the cassette can't be ejected.	- The cam switch is poorly adjusted for its positioning. - IC802 is defective. - Capstan motor control circuit is defective.
4.	The unit will stop immediately after it is set in playback or record mode.	- Check if the head switching pulse is applied to pin ⑳ (for the drum sensor) of IC801. - Check if the drum motor is rotating. - Check if the drum pulse generator's signal is applied to pin ⑰ of the servo circuit (IC703).
5.	The unit will stop a few seconds after it has been set in playback or record mode, or the tape running will stop on the way.	- Check if the reel pulse is applied to pin ㉑ (for the reel sensor) of IC801. - Check if the reel disk is rotating. - Check if the reel idler is not stained nor defective.
6.	The tape is not running (the tape is not taken up.)	- The capstan motor and/or reel idler is defective. - The reel brake is defective.
7.	The unit stops sometimes during playback or recording.	Check if there is produced capstan mute signal at pin ㉓ of IC801.
	The tape can't be taken up when tape unloading.	Check if there are reel sensor signal and drum sensor signal applied to pins ㉑ and ㉒ of IC801 respectively.
	The tape is scratched when it is wound video search is impossible.	- Check if there is produced capstan motor rotation signal (reverse) at pin ㉔ of IC801 when tape unloading. - Check if pins ㉑ and ㉒ of IC801 (servo mode signal) are at their proper level. - Check if there are proper voltages at pins ⑲ , ㉒ , ㉑ and ㉒ of IC702 when the unit is in the video search mode.

■ TROUBLES OF CONTROL SYSTEM (SERVO CIRCUIT)

No.	Problems	Probable causes and countermeasures
1.	Capstan motor is not rotating. When the unit is in playback or record mode, there is no reel pulse produced (to disable the reel take-up operation) so that the microcomputer in the system controller gets in stop mode when some length of time has elapsed.	- There is not clock signal (4.43MHz and/or 3.58MHz) at pin ⑮ of IC702 (main servo IC) or the output level of clock signal, if exists, is insufficient. Note: When measuring the output of pin ⑮ of IC702, the probe of oscilloscope in use must be of low capacitance, or the measurement will be inaccurate. - Check if PC5.1V and AT5V are as specified. - Check if the chroma circuit and switching circuit are normally functioning. Also check if their signal output level is normal. - Check for voltage of Q713. - Capstan motor drive voltage is higher or lower than specified (with AT15V being as specified). - Check if vertical reference voltage is about 2.5V (at pin ⑥ of AB connector). If so, check for operation of the capstan motor. - Check if current limiter voltage is about 0.8V (at pin ③ of AB connector). If so, check for operation of the capstan motor (to see if Q7015 is turned on). - Check if capstan motor control voltage is about 3V (at pin ④ of AB connector). If so, check if vertical reference voltage is as specified (at pin ⑮ of IC7001); check if output voltages at pins ⑧, ⑩ and ⑪ of IC701 are all normal. - The voltage for capstan motor reverse rotation is not as specified (at pin ⑨ of AB connector). In this case, check for the system controller.
2.	Capstan motor rotates at higher speed than specified.	- There appears no capstan frequency generator's signal. - Check for the capstan motor. - Check for the circuit around IC701. - There is produced no capstan PWM (pulse width modulation) pulse. - Check for mode 1, mode 2 and VSC (video search control) 0 to 3 (at pins ⑩, ⑪, ⑲ to ⑳ of IC702). - Check for IC705 and IC702.
3.	Capstan motor rotates at lower speed than specified.	- Playback speed detection circuit functions incorrectly (there is High level output at pin ⑥ or ⑦ of IC701). - Check for output voltages at pins ② to ⑧ of IC703 (playback control amplifier).

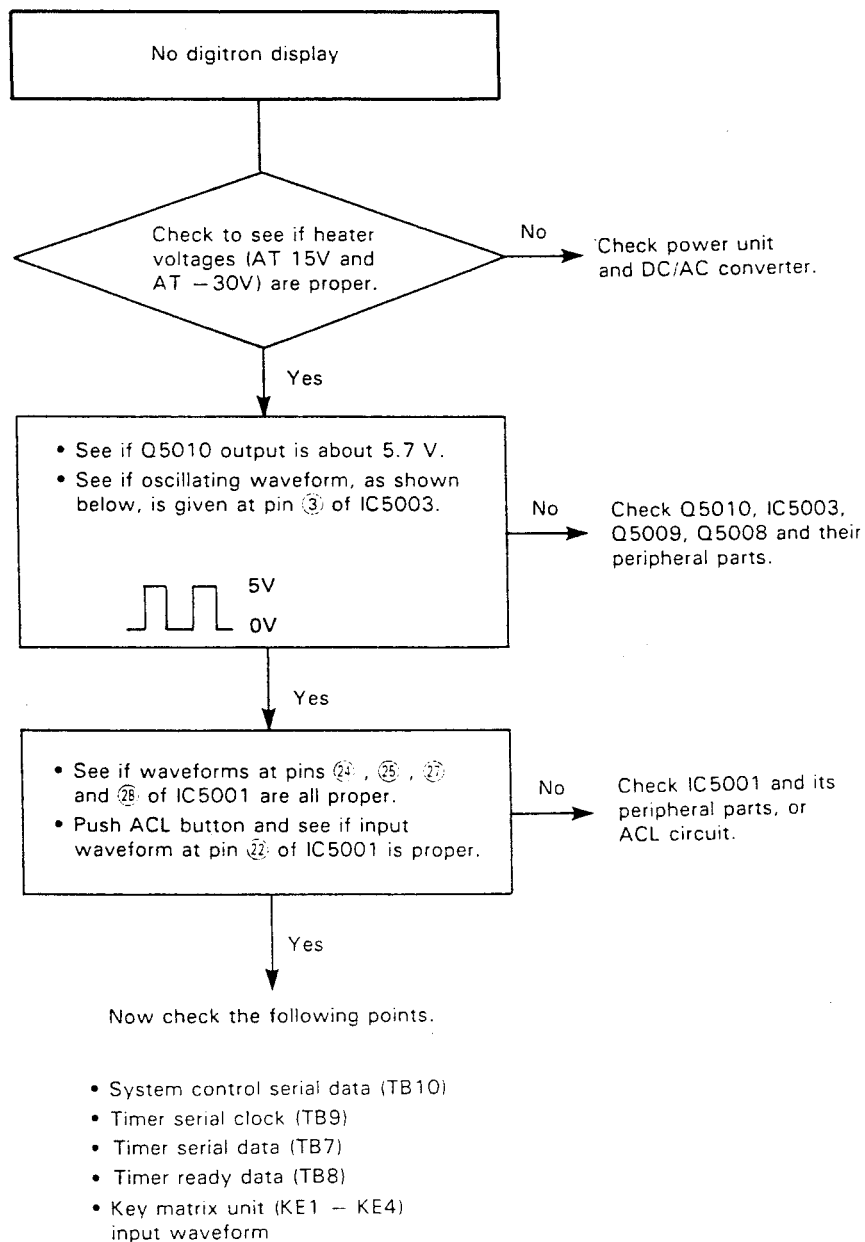
No.	Problems	Probable causes and countermeasures
4.	Noise appears at reproduced picture periodically.	- Capstan servo circuit is defective. - Check for the loop in which playback control signal is flowing. - Check if there is vertical sync signal (tracking monomultivibrator) at pin ⑩ of IC703. - Check for the loop in which capstan AFC/APC, PWM, LPF and DC amplifier are arranged.
5.	Horizontal bar (noise) appears at the lower part of reproced picture.	- Playback phase is misadjusted. - Check for R748, R750, R752 and R754.
6.	Picture flows horizontally.	- This phenomenon does not occur in the compulsive mode. - Check and readjust the sync separator and 50Hz/60Hz discriminator circuit. - Check the 50Hz/60Hz selection line and the position of SW5019. (High level at 60Hz line, etc.) - Picture flows horizontally at any mode. - Check the drum servo block (drum FG amplifier, clock frequency, output voltage, drum motor control amplifier and drum motor).
7.	Slow operation and frame advance are not available.	- Check if there is frame advance pulse at pin ④ fo IC7001. - Check if still/slow pulse (Low level) is applied to pin ②② of IC702. - Check if clock signal (about 1 Vp-p) is applied to pin ⑬ of IC7001. - Check if square wave (capstan FG waveform) is applied to pin ⑥ of IC7001 when capstan motor is in motion. - Check if there is a normal voltage at pin ②⑧ (capstan motor's current limiter control) of IC7001.

■ TROUBLES OF SOUND AND REPRODUCED PICTURE (Y/C AND AUDIO CIRCUIT)

No.	Problems		Probable causes and countermeasures
1.	No picture appears.	At E-E mode	- Check if the video signal (E-E signal) is applied to pin ④ of IC201, and if it goes out of pin ⑩ . - Check if there is a normal voltage at each pin of IC201.
		At playback of standard tape	- Make sure that there appears a normal picture at E-E mode. - Check if playback FM signal is applied to pin ⑱ of IC401. - Check if playback FM signal is reproduced at pin ⑳ of IC301.
		At playback of the tape record by oneself.	Before this checking, make sure that normal playback is possible with standard tape. - Check if there is playback FM signal at pin ⑱ of IC401. - Check if there is video signal at pin ㉕ of IC401 and pin ⑩ of IC201.

No.	Problems	Probable causes and countermeasures
2.	No colour appears.	• Check if there is playback chroma signal at pin ②② of IC501. • Check if APC and/or AFC is not misadjusted. If it is not allowed to readjust them, this means that IC501 is defective. • Check if there is a normal voltage at each pin of IC501.
3.	The picture collapses when the tape recorded by oneself is played back. 	• Check if there is a normal voltage at each pin of head amplifier. • Check if record current is not misadjusted. • Check if deviation level, FM frequency and white/dark clip level are not misadjusted.
4.		• Check if video head is not choked. • Check if head amplifier is set at proper position. • Check if head switching pulse is normal.
5.	Noise is noticeable at E-E mode or when the tape recorded by oneself is played back.	• Tuner and/or RF converter is defective. • Check if R1570 (RF AGC control) is not misadjusted.
6.	Noise is noticeable when the standard tape is played back.	• Clean the video head or replace it with a new one.
7.	There appears no E-E sound.	• Check if there appears audio signal at pin ③ of IC1501. • Check if audio signal is applied to pin ① of IC601 and goes out of pin ⑨. • ALC is defective (D603, C606). • Check if the audio muting circuit is normally operating.
8.	There appears much of audio noise at E-E mode.	• Check if RF converter and audio switching circuit are normally operating. • Check if FL1502 and FL1503 are normally operating.
9.	There appears no sound at playback mode.	• The audio head is defective. • Check if playback signal is applied to pin ①⑥ of IC602 and goes out of pin ⑨.
10.	Sound is distorted.	• The audio head is magnetized or defective. • Bias current is insufficient.
11.	Record/Playback sensitivity is low.	• The audio head is magnetized or defective. • The bias circuit is not operating.
12.	Recording is not possible.	• The bias circuit is not operating.
13.	There appears much of hum and noise.	• The audio head is defective.

■ Digitron display of timer circuit



MECHANICAL DRIVE SECTION NAMES OF PARTS

• TOP VIEW

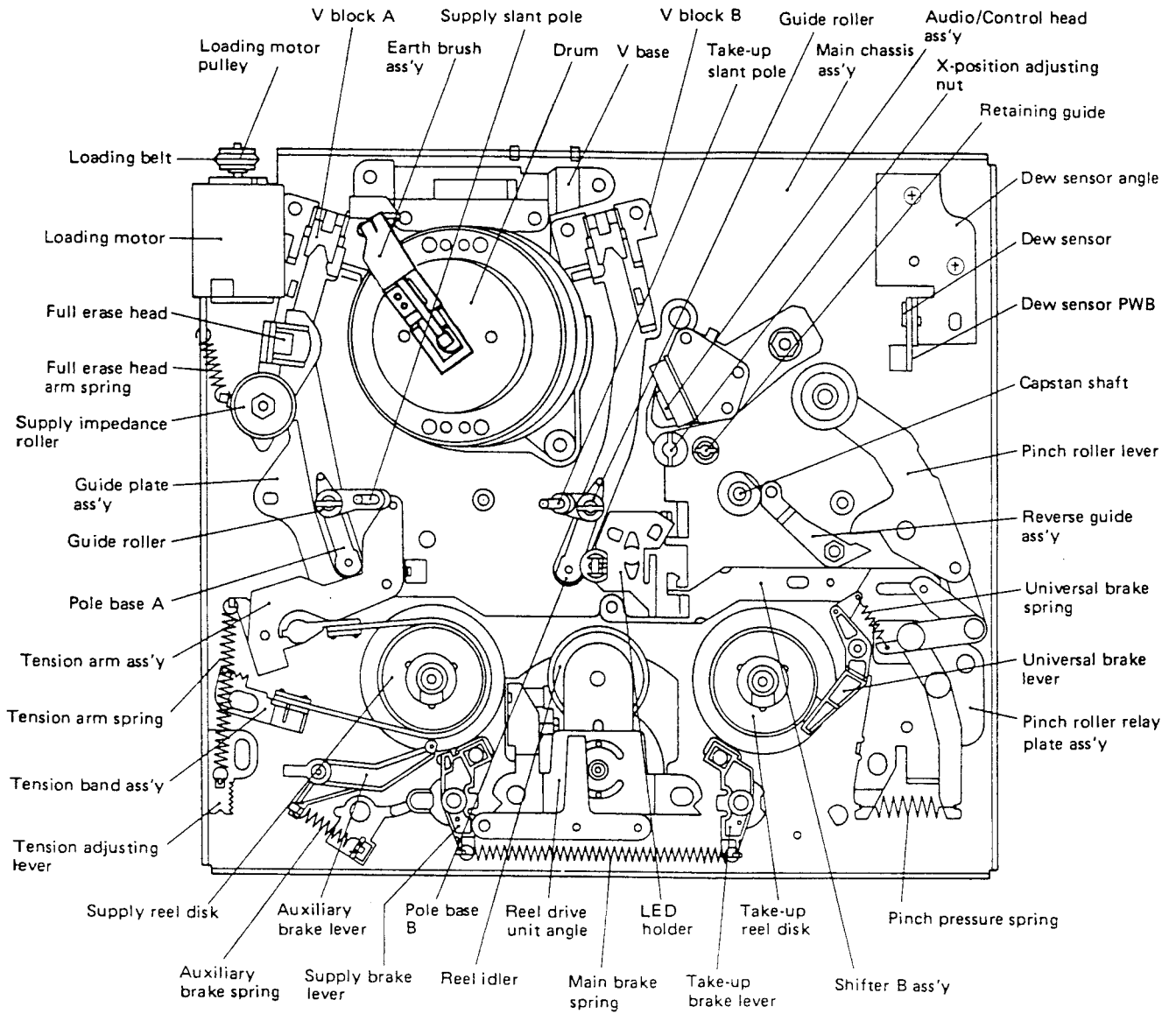


Figure 1-2.

• BOTTOM VIEW

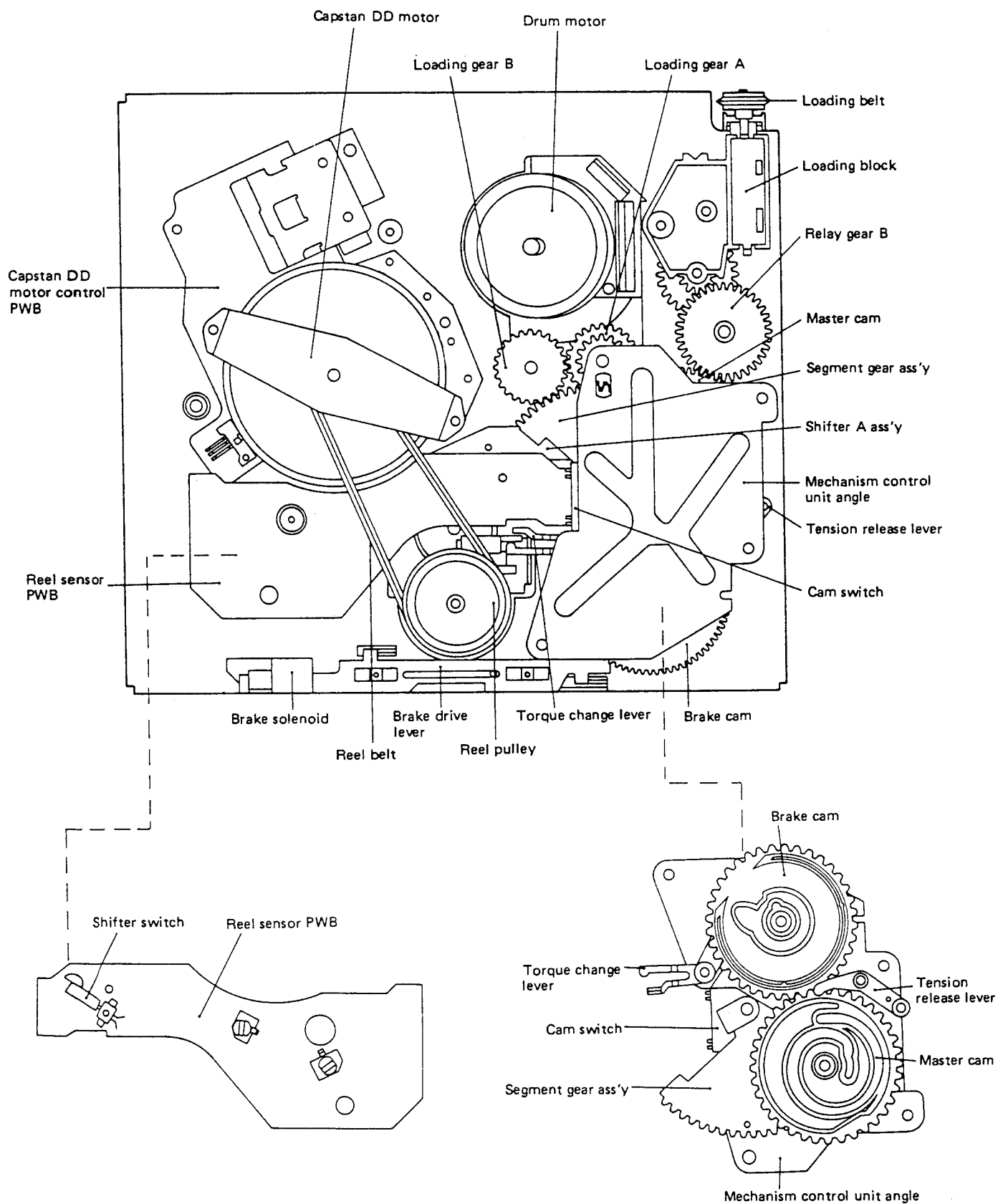


Figure 1-3.

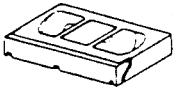
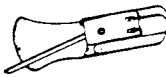
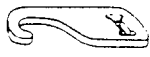
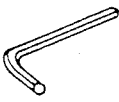
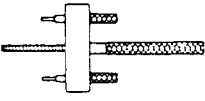
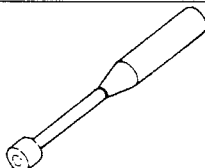
ADJUSTMENT, REPLACEMENT, ASSEMBLY AND CLEANING OF MECHANICAL UNITS

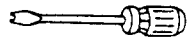
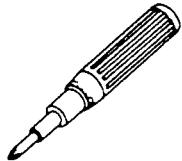
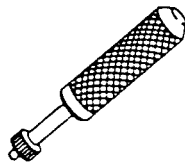
Here we will describe a relatively simpler service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly or replacement, for example).

We are sure that the easy-to-handle tools listed below would be more than handy for periodical maintenance to keep the machine in its original efficient condition.

■ TOOLS NECESSARY FOR ADJUSTING MECHANICAL UNITS

The following tools are required for proper service and satisfactory repair.

	Jig Item.	Part No.	Code	Configuration	Remarks
1	Master plane and reel disk height adjusting jig.	JiGRH0002	BR		These jigs are used for checking and adjusting of relative mechanical heights between reel disk and stay.
		JiGMP0001	BY		
2	Audio/Control head tilt adjusting jig.	JiGACH51B	BU		This jig is used for height adjustment of the running tape.
3	Torque gauge (90g.cm)	JiGTG0090	CM		These jigs are used for checking and adjusting the torque of take up and supply reels.
	Torque gauge (1.2kg.cm)	JiGTG1200	CN		
4	Gauge head	JiGTH0006	AW		
5	Torque cassette meter	JiGVHT-063	CZ		Torque cassette meter can be used to measure take-up reel torque in the playback and recording mode as well as back tension.
6	Tension gauge (300g)	JiGSG0300	BF		There are several gauges used for the tension measurements.
	Tension gauge (2.0kg)	JiGSG2000	BS		
7	Tension gauge adapter.	JiGADP003	BK		This jig is used for the tension gauge.
8	Hexagon wrench (0.9 mm)	JiGHW0009	AE		These jigs are used for loosening or tightening special hexagon type screws.
	Hexagon wrench (1.2 mm)	JiGHW0012	AE		
	Hexagon wrench (1.5 mm)	JiGHW0015	AE		
9	Drum replacement jig	JiGDT-0001 or JiGDT-0001CD	BG AZ		This jig is used for the replacement of video cassette recorder's upper drum.
10	Box driver	JiGDRIVER110-7	AS		This jig is used for height adjustment of the audio/control head.
		JiGDRIVER11055	AR		This jig is used for adjustment of the supply impedance roller and reverse guide.

	Jig Item.	Part No.	Code	Configuration	Remarks
11	Alignment tape cassette	VRōCPSV	CK		This tape is especially used for electrical adjustment.
12	Special bladed screwdriver	JiGDRiVERH-4	AP		This screwdriver is used for adjusting the guide roller height.
13	Torque driver	JiGTD1200	CB		When screwing is needed at the resin-made part, be sure to use this torque driver: the specified torque is 5 kg.
14	Tension band and plate adjusting driver	JiGDRiVER-6	BM		This jig is used for adjusting tension band and tension plate.

NOTE:

Current JiGMA0001 contains master plane (JiGMP0001) and disk height adjusting jig (JiGRH0001). Even though new disk height adjusting jig (JiGRH0002) covers wider height, this new jig (JiGRH0002) can be used for current JiGRH0001, current jig (JiGRH0001) cannot be used as JiGRH0002. Master plane (JiGMP0001) can be used with JiGRH0001, and also JiGRH0002.

Failure to use the listed tools will make repair work lengthy and a matter of trial and error, with the likelihood of ultimately unsatisfactory results.

These tools will be required frequently, so be sure to follow the instructions in this manual throughout the repair, adjustment and checking process.

■ PREVENTIVE CHECKS AND SERVICE INTERVALS

The following intervals for checks and servicing should be observed in order to maintain the high quality of mechanical components.

Maintained every	500	1000	1500	2000	3000	Remarks
Parts	hrs.	hrs.	hrs.	hrs.	hrs.	
Guide roller ass'y	□	□	□	□	□	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller	□	□	□	□	□	
Supply impedance roller (inner)		□		□	□	Clean with industrial-grade methyl alcohol.
Supply impedance roller flange B	□	□	□	□	□	Clean tape contact area with the specified cleaning liquid.
Retaining guide	□	□	□	□	□	
Guide flange B	□	□	□	□	□	
Slant pole	□	□	□	□	□	
Video head	□	○ □	□	○ □	○ □	Clean tape contact area with the specified cleaning liquid.
Full erase head	□	□	□	□	□	
Audio/Control head	□	□	□	□	□	
Pinch roller	□	□	□	□	○ □	Clean rubber and rubber contact area with the specified cleaning liquid.
Reel belt		□		○		
Loading belt		□		○		
Capstan D.D. motor				○		
Loading motor				○		
Supply/Take-up reel disks		□ △		□ △		Clean with industrial-grade methyl alcohol.
Tension band ass'y					○	
Reel drive unit					○	
Reel idler	□	□	□	□	□	
Pulley (B)	□	□	□	□	□	
Universal brake lever				○		
Supply/Take-up brake levers					○	

○ ... Replace □ ... Clean △ ... Oil

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

Notes:

1. During removal and reassembly of the cassette housing, take care not to hit the nearby guide pins and the drum.
2. Do not forget to remove the AC power supply plug from the wall outlet at removal and reassembly.

Removal

1. Press the cassette eject button, and remove the cassette from the housing.
2. Pull off the connector on the right side of the cassette housing.

Note:

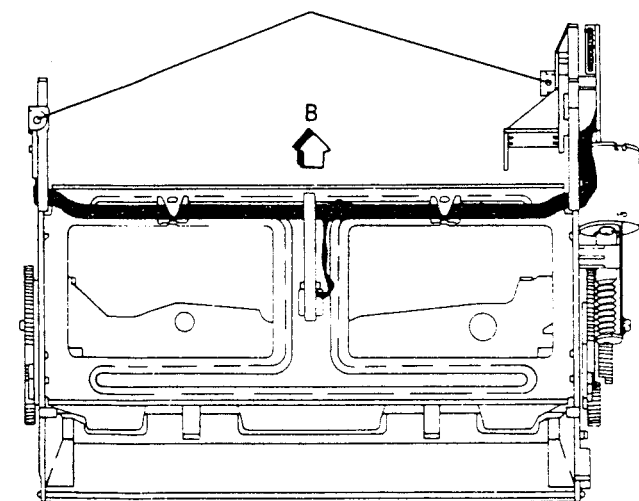
Be careful not to break the leads of the connector.

3. Remove two screws fixing the cassette housing.
4. Shift the cassette housing toward the arrow $\Rightarrow$ B direction shown in Fig. 1-4 and take it out upwards..

Reassembly

1. Connect the connector on the right side of the cassette housing.
2. Insert the hooks of the cassette housing into main chassis, shift it toward the arrow $\Rightarrow$ A, and fix it temporarily. Check if the cassette housing is placed in the right position and fix it with two screws (XHPS330P06WS0).
3. Arrange the leads of the connector properly on the right side of the cassette housing.

Cassette housing fixing screws



Insert the hooks of the cassette housing into main chassis.

Figure 1-4.

WHEN RUNNING A TAPE WITHOUT CASSETTE HOUSING

1. Open the cover of a cassette tape by hand and hold it open with a piece of vinyl tape.
2. Set the cassette tape in the tape mechanism. Then stabilize the cassette tape with a weight (500g or less).

Note:

The weight should not be more than 500g.

REPLACEMENT AND HEIGHT ADJUSTMENT OF REEL DISKS

Removal of supply reel disk

1. Remove the tension band (7), and tension arm (8).
2. Remove the slit washer (1).
3. Lift the supply reel disk (3) upwards to remove, and replace.

Removal of take-up reel disk

1. Remove the slit washer (1).
2. Lift the take-up reel disk (4) upwards to remove, and replace.

Notes:

1. After replacing either of the reel disks, be sure to perform it's height adjustment.
2. Take care not to damage to the tension band (7).
3. Be careful not to deform the auxiliary brake lever, supply brake lever, take-up brake lever and universal brake lever.
4. Check the tension pole position (see Fig. 1-11).

* At the time, remove the height adjusting washer (5) and clean it.

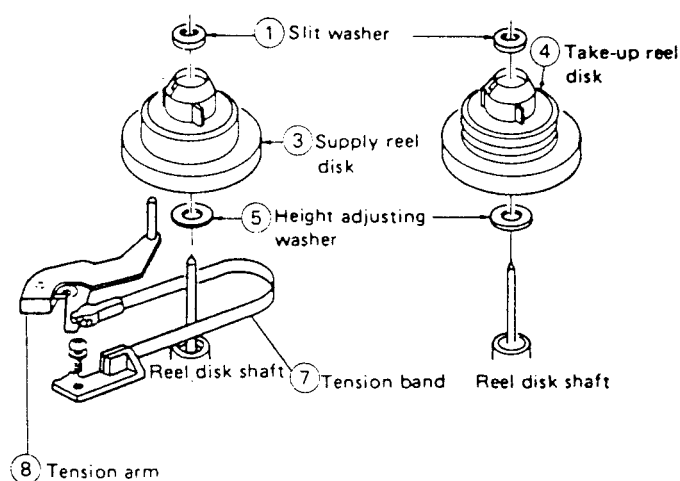


Figure 1-5.

Reassembly of supply reel disk

1. Clean the reel disk shaft and fit the height adjusting washer ⑤.
2. Place the new supply reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and the reel height adjusting jig.
4. Take the new supply reel disk off, apply oil to the reel disk shaft and again place the disk onto the shaft.

Note:

The reel disk thrust play should be 0.1 to 0.8mm.

5. Fit the slit washer ①.
6. Fit the tension band ⑦, and tension arm ⑧.

Reassembly of take-up reel disk

1. Clean the reel disk shaft and fit the height adjusting washer ⑤.
2. Place the new take-up reel disk ④ onto the shaft.
3. Adjust the reel disk height by using the master plane and the reel height adjusting jig.
4. Take the new take-up reel disk off, apply oil to the reel disk shaft and again place the disk onto the shaft.

Note:

The reel disk thrust play should be 0.1 to 0.5mm.

5. Fit the slit washer ①.

Notes:

1. Take care not to scratch the reel disk or shaft with a slit washer or a tool at removal and reassembly.
2. After reassembly of the take-up reel disk, check the back tension in the video search mode and also the brake torque. (See the instructions on pages 15 and 16).

HEIGHT CHECKING AND ADJUSTMENT OF REEL DISK

1. Remove the cassette housing and set the master plane in the mechanism as shown in Fig. 1-10 (a), taking care not to hit the drum.
2. Insure that the reel disk is lower than the part "A" but higher than part "B" of Fig. 1-6 (b), by using the reel disk height adjusting jig.

If the height is not correct use the height adjusting washers: looseness in backlash on the shaft should not exceed 0.1 to 0.8mm.

Note:

Whenever replacing the reel disk, perform the height adjustment.

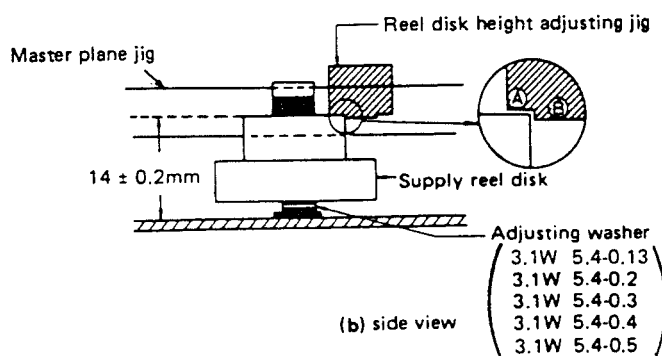
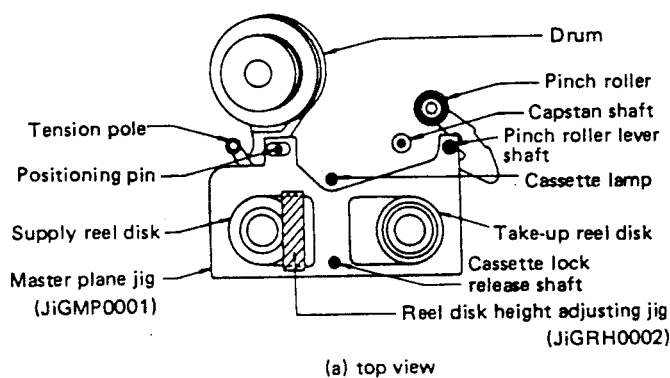


Figure 1-6.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN FAST-FORWARD MODE

Notes:

1. When setting the torque gauge on the reel disk and pressing the fast-forward button to start the reel disk turning, take care that the torque gauge does not fly off.
2. The checking and adjustment should be carried out without a video cassette tape in place.

Checking

1. Remove the cassette housing.
2. Set the torque gauge on the take-up reel disk and press the fast-forward button to get the unit in the fast-forward mode.
3. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction until it indicates 600g.cm or more.

Check that there is no slippage between the reel idler, and relay idler or take-up reel disk.

Adjustment

If the take-up torque is outside the specified value, clean the relay idler, reel idler and take-up reel disk with cleaning fluid, and recheck the torque.

If the take-up torque is still out of specification, replace the reel belt.

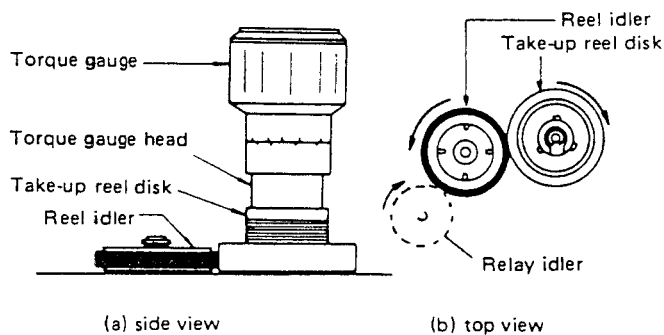


Figure 1-7.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN REWIND MODE

Notes:

1. When setting the torque gauge on the reel disk and pressing the rewind-button to start the reel disk turning, take care that the torque gauge does not fly off.
2. When checking the take-up torque, do not keep the reel disk in a lock condition for a longer time.

Checking

1. Remove the cassette housing.
2. Set the torque gauge on the supply reel disk and press the rewind button to get the unit in the rewind mode.
3. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction until it indicates 600g.cm or more. Check that there is no slippage between the reel idler and relay idler or supply reel disk.

Adjustment

If the take-up torque is outside the specified value, clean the relay idler, reel idler and supply reel disk with cleaning fluid then recheck the torque.

If the take-up torque is still out of specification, replace the reel belt.

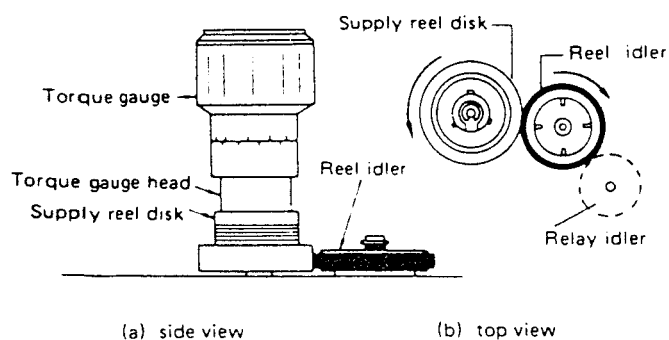


Figure 1-8.

CHECKING OF TAKE-UP TORQUE IN PLAY BACK MODE

Checking

Load a torque cassette meter (JiGVHT-063) into the unit and press the record button to get the unit in the record mode. (It is necessary to input the external signal). Then check that the torque is at the specified values;

standard torque: $110 \pm 40\text{g.cm}$

Note:

The measured torque varies slightly with the rotation deviation of the reel drive unit. The control value within the variation shall be the observed value.

Adjustment

1. If the take-up torque in playback mode is outside the specified value, clean the reel idler, take-up reel disk and relay idler with cleaning fluid, then recheck the torque.
2. Press the record button to get the unit in the record mode, and check that the take-up torque is within the specified value.
3. Even after step 1 above, if the take-up torque in playback mode is still out of specification, replace the reel drive unit.

CHECKING OF BACK TENSION IN FAST-FORWARD MODE

Note:

Set the torque gauge securely on the reel disk; otherwise the torque gauge will be loose above the reel disk causing an inaccurate measurement.

Checking

1. Remove the cassette housing.
2. Press the fast-forward button to get the unit in the fast-forward mode.
3. Set the torque gauge on the supply reel disk, turn it clockwise slowly (one rotation every 2 to 3 seconds) and check that the torque is within $37 \pm 5\text{g.cm}$.

CHECKING OF BACK TENSION IN REWIND MODE

Note:

Set the torque gauge securely on the reel disk; otherwise the torque gauge will be loose above the reel disk causing an inaccurate measurement.

Checking

1. Remove the cassette housing.
2. Press the rewind button to get the unit in the rewind mode.
3. Set the torque gauge on the take-up reel disk, turn it counterclockwise slowly (one rotation every 2 to 3 seconds) and check that the torque is within $25 \pm 5\text{g.cm}$.

CHECKING OF BACK TENSION IN VIDEO SEARCH REWIND MODE

Note:

Set the torque gauge securely on the reel disk; otherwise the torque gauge will be loose above the reel disk causing an inaccurate measurement.

Checking

1. Remove the cassette housing.
2. Press the play button to get the unit in the playback mode.
3. Press the video search rewind button to get the unit in the video search rewind mode.
4. Set the torque gauge on the take-up reel disk, slowly turn it counterclockwise (one rotation every 2 to 3 seconds) and check that the torque is within $40 \pm 8 \text{ g.cm}$.

CHECKING OF PINCH ROLLER ENGAGEMENT FORCE

Checking

1. Remove the cassette housing.
2. Press the play button to get the unit in the playback mode.
3. Using a tension gauge adapter, pull the pinch roller in the direction of arrow $\Rightarrow$ (A) (opposite to the pinch roller engagement) to that the pinch roller moves away from the capstan shaft.
4. Gradually return the pinch roller in the direction of arrow $\Rightarrow$ (B) to allow it to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge (JiGSG 2000).

For the measurement, pull the tension gauge which is to be fixed on the capstan shaft by means of the tension gauge adapter (JiGADP003).

5. Check that the reading on the gauge is in the specified range of 1000 to 1200g.

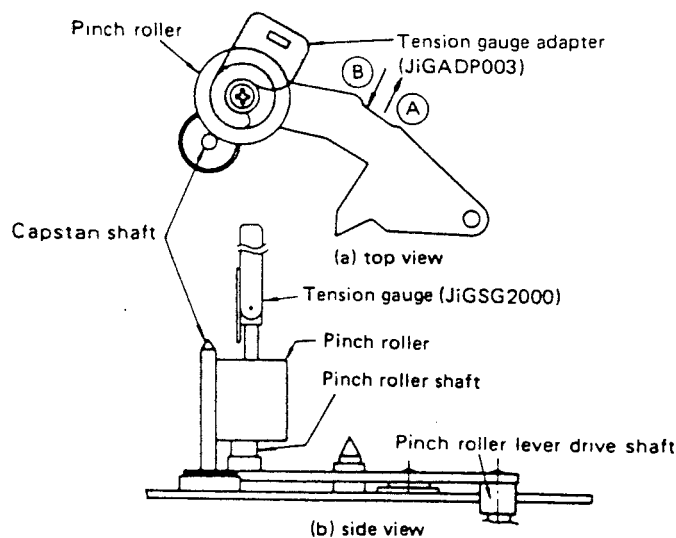


Figure 1-9.

CHECKING OF REEL IDLER PRESSURE

Checking

1. Remove the cassette housing.
2. Move the reel idler to its center position as shown in Fig. 1-10.
3. Using a tension gauge, press the reel idler in the direction of arrow $\Rightarrow$ (A) in Fig. 1-10, so that the reel idler moves away from the relay idler.
4. Release the force gradually in the direction of arrow $\Rightarrow$ (B) in Fig. 1-10, so that the reel idler touches the relay idler again. Check that the reading on the tension gauge is within the specified range of 105 to 145g.

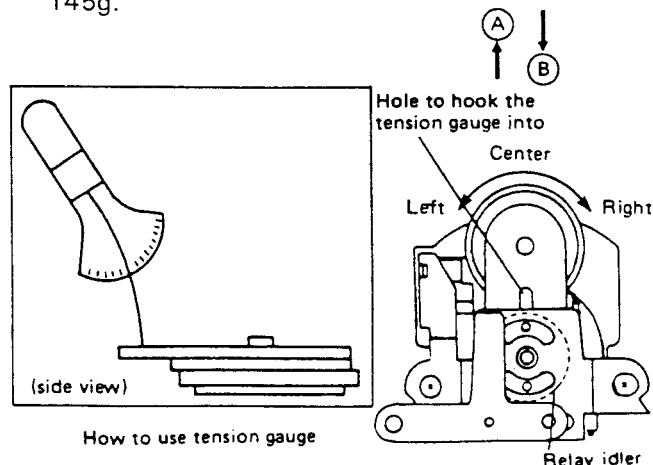


Figure 1-10.

CHECKING AND ADJUSTMENT OF TENSION POLE POSITION

Checking

1. Remove the cassette housing.
2. Load a video cassette tape and press the record button to get the unit in the record mode.
3. The pole bases A and B operate to draw the tape out of the cassette housing and simultaneously the tension pole moves to the left, loading the tape. Check the position of the tension pole after the tape loading has finished.
4. At the end of a tape (E-180), visually check that the tension pole's center is 0.6 to 1.0mm to the right of the supply impedance roller's center.
5. Check that the tape is neither curled against the flange of the supply impedance roller nor mounted over it.
6. During the video search rewind mode, check that the reel disk is free of the tension band.

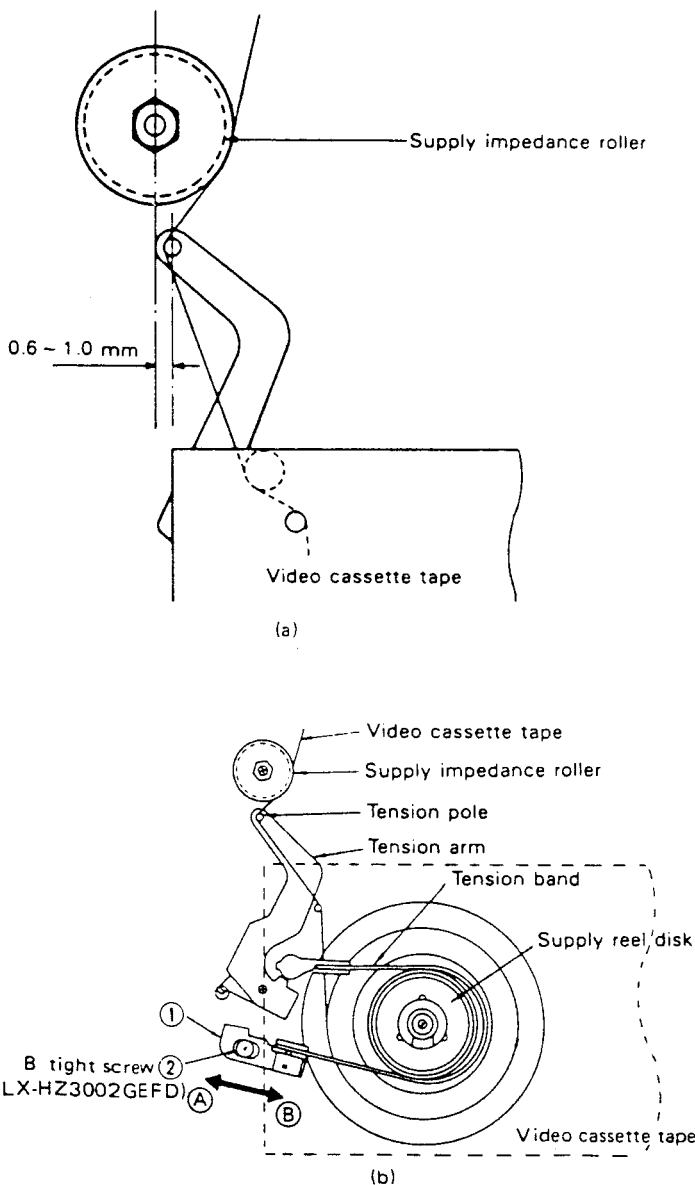


Figure 1-11.

Positioning adjustment

1. If the tension pole is less than 0.6mm to the right of the supply impedance roller's center, shift the tension band control angle ① in the direction of arrow ➡ A in Fig. 1-11(b), and tighten the screw ②.
2. If the tension pole is more than 1.0mm to the right of the supply impedance roller's center, shift the tension band control angle ① in the direction of arrow ➡ B in Fig. 1-11(b), and tighten the screw ②.

Note:

If the screw is tightened with more than the specified torque (5 kg), the screw hole will be crushed as it is made of resin.

To avoid this, be sure to use the supplied torque driver (JiGTD1200).

CHECKING AND ADJUSTMENT OF BACK TENSION IN RECORD AND PLAYBACK MODES

Checking of back tension using a torque cassette meter (JiGVHT-063)

1. Remove the cassette housing.
2. Load the torque cassette into the unit.
3. Press the record button to get the unit in the record mode.
4. Check that the reading of the torque cassette's pointer is within 50 to 58g.cm.
5. Check that the video tape is wound round the retaining guide.
6. Check that the tape is not slack or damaged at either of its beginning and end points.

Adjustment

1. If the reading is below 50g.cm, shift the tension adjusting lever ① in the direction of arrow ➡ A in Fig. 1-12, and tighten the screw ②.
2. If the reading is over 58g.cm, shift the tension adjusting lever ① in the direction of arrow ➡ B in Fig. 1-12, and tighten the screw ②.

Note:

Do not overtighten the screws as this may damage the screw threads on the chassis. To avoid this, properly handle the tension band and plate adjusting driver (JiGDRIVER-6).

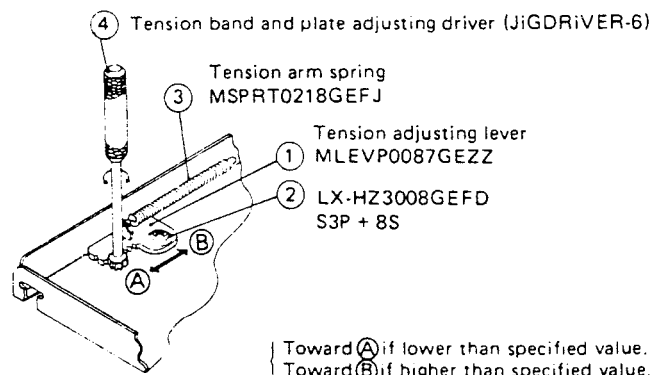


Figure 1-12.

CHECKING OF THE BRAKE TORQUE

Checking of the brake torque at supply side

1. Remove the cassette housing.
2. Check that the unit is in the stop mode.
3. Separate the reel idler from the supply reel disk, and set the torque gauge on the supply reel disk.
4. Slowly rotate the torque gauge in both directions so that both the reel disk and torque gauge's pointer will move at the same speed: see that the reading is then within 280 to 720g.cm (at the brake engaging direction) or within 110 to 230g.cm (at the brake disengaging direction). And check that the brake ratio is more than 2 between its engaging and disengaging directions.

Adjustment of the brake torque at supply side

1. If the brake torque at supply side is outside the specified value (280 to 720g.cm in the engaging direction or 110 to 230g.cm in the disengaging direction), clean the supply reel disk and brake lever felt with cleaning fluid, then recheck the torque.
2. If the brake torque at supply side is still out of specification, replace the main brake spring.

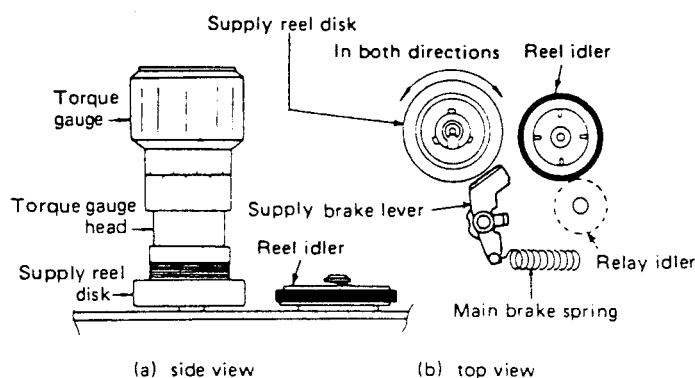


Figure 1-13.

Checking of the brake torque at take-up side

1. Remove the cassette housing.
2. Check that the unit is in the stop mode.
3. Separate the reel idler from the take-up reel disk, and set the torque gauge on the take-up reel disk.
4. Slowly rotate the torque gauge in both directions so that both the reel disk and torque gauge's pointer will move at the same speed: see that the reading is then within 280 to 720g.cm (at the brake engaging direction) or within 110 to 230g.cm (at the brake disengaging direction). And check that the brake ratio is more than 2 between its engaging and disengaging directions.

Adjustment of the brake torque at take-up side

1. If the brake torque at take-up side is outside the specified value (280 to 720g.cm in the engaging direction or 110 to 230g.cm in the disengaging direction), clean the take-up reel disk and brake lever felt with cleaning fluid, then recheck the torque.
2. If the torque at take-up side is still not within the specified value, replacement the main brake spring.

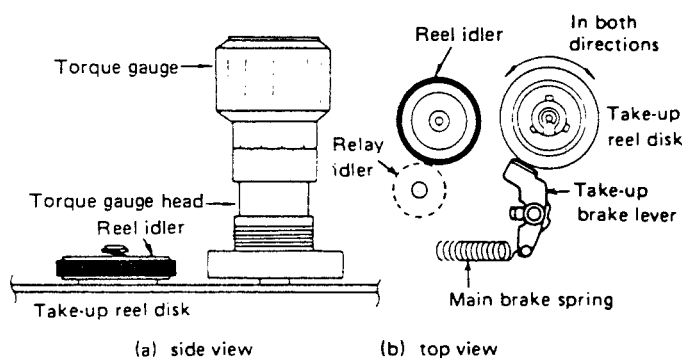


Figure 1-14.

TILT CHECKING AND ADJUSTMENT OF AUDIO/CONTROL HEAD

Adjustment

1. Put the unit in the unloading mode. Set the audio/control head tilt adjusting jig on the main chassis as shown in Fig. 1-15. For details, also see Fig. 1-15. Using a philips screwdriver, slowly turn the adjusting screw until there is no clearance between the jig and audio/control head. (See Fig. 1-20)

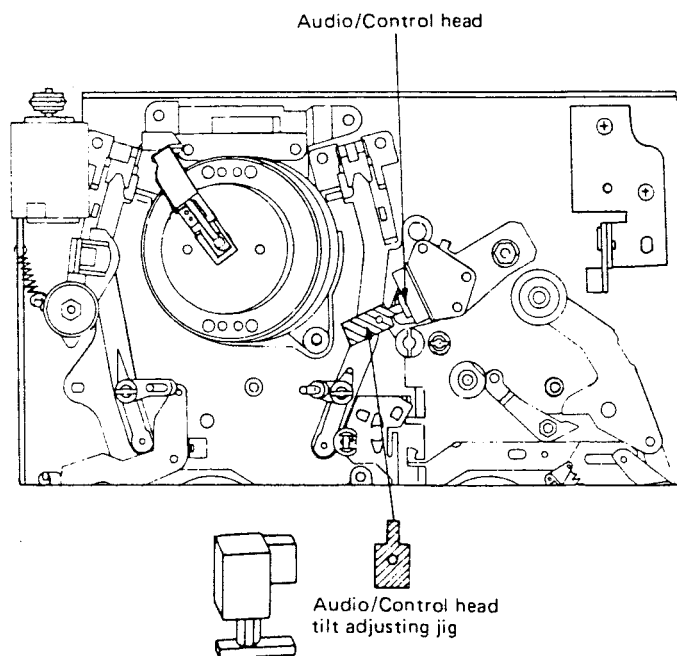


Figure 1-15.

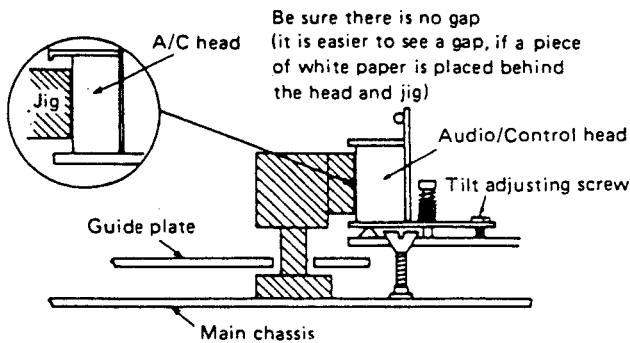


Figure 1-16.

REPLACEMENT OF AUDIO/CONTROL HEAD

Note:

After replacement, check for smooth tape movement. Under all circumstances avoid touching the head surface (indicated by "→" in Fig. 1-18).

Replacement

1. Remove the leads from the audio/control head PWB.
2. Undo the tilt adjusting screw ⑥ with a philips screwdriver.
3. Remove the screw ⑤ (3P+8S) with a philips screwdriver.
4. Undo the audio/control head screw ④ with a philips screwdriver: pay attention to the spring between the guide plate and the audio/control head screw.
5. Unsolder the connector attached to the audio/control head PWB, and resolder this connector to the new audio/control head PWB. Then replace the audio/control head assembly with a new one.
6. Install the new audio/control head assembly so that the audio/control head plate is almost in parallel with the guide plate.
7. Adjust the audio/control head tilt angle as shown in Fig. 1-16.
8. Use a rough alignment tape and play it back. Using the specified box driver, turn the hexagon nut for audio/control head height adjustment so that the audio/control head has the height with regard to the tape as shown in Fig. 1-17.

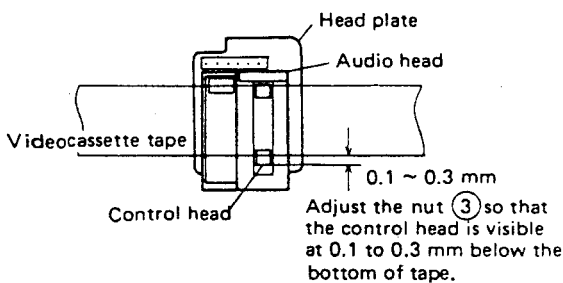


Figure 1-17.

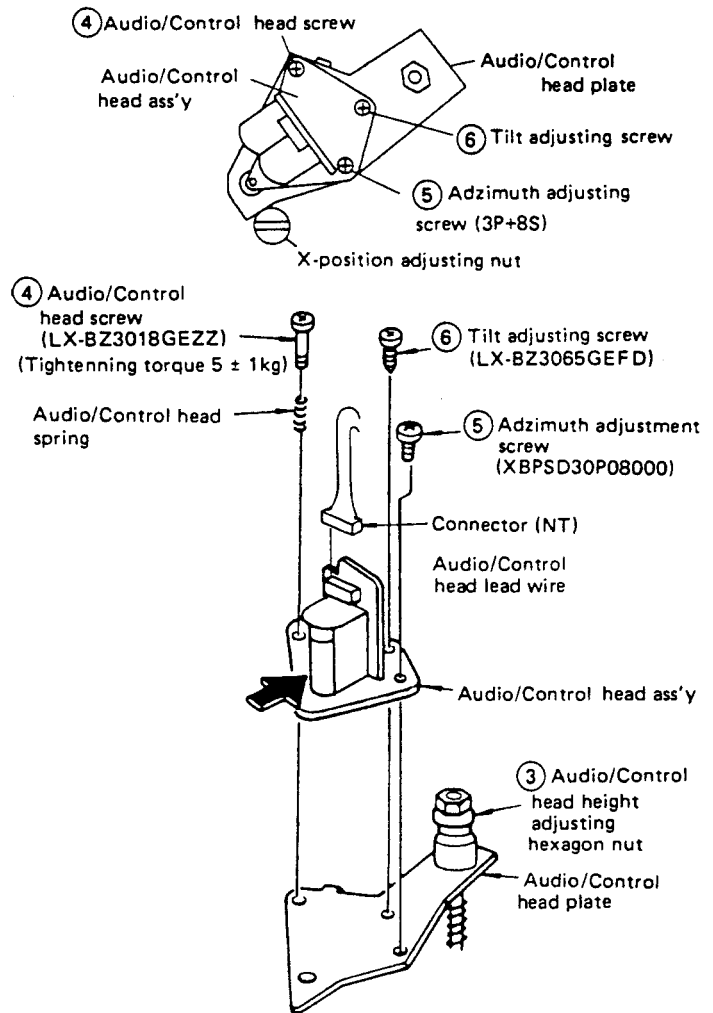


Figure 1-18.

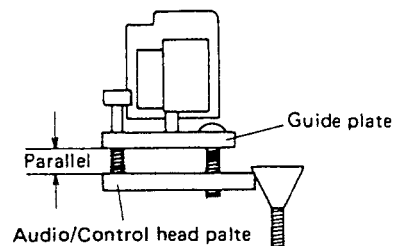


Figure 1-19.

ADJUSTMENT OF TAPE TRAVEL

1. Check and adjust the position of the tension pole. And check and adjust back tension (See page 20).
2. Set the tilt angle of the audio/control head as shown in Fig. 1-16.

Note:

If the audio/control head is adjusted, check and set the tilt angle as in the case of replacement.

3. After completing setting, execute preliminary adjustment of tape travel.
 - a. Connect an oscilloscope to TP301 (playback chrominance) and TP303 (ground). Allow the playback chrominance signal to be triggered by the head switching pulse of TP302.
 - b. Loosen the setscrew of the guide roller, and tighten it loosely by using a guide roller adjusting screwdriver (JiGDRIVERH-4) to such an extent so that the guide roller turns smoothly.
 - c. Set an alignment tape (VR6CPSV) on the reel disk.

Note:

When setting the cassette tape on the reel disk without cassette housing, fix the cassette tape with weight of 400 to 650g.

- d. Set playback mode.
- e. Observe the playback chrominance envelope waveform and check flatness of the playback chrominance envelope, turning the tracking control clockwise and counterclockwise.

If playback chrominance output changes almost flat when the tracking control is turned clockwise and counterclockwise, it is good. If the flatness is poor, adjust the guide roller so that playback chrominance output becomes nearly flat.

Adjust the X-position adjusting nut so that the playback chrominance envelope becomes almost maximum in the tracking center. In the case of rough adjustment, pay particular attention to the outlet side (See Fig. 1-21).

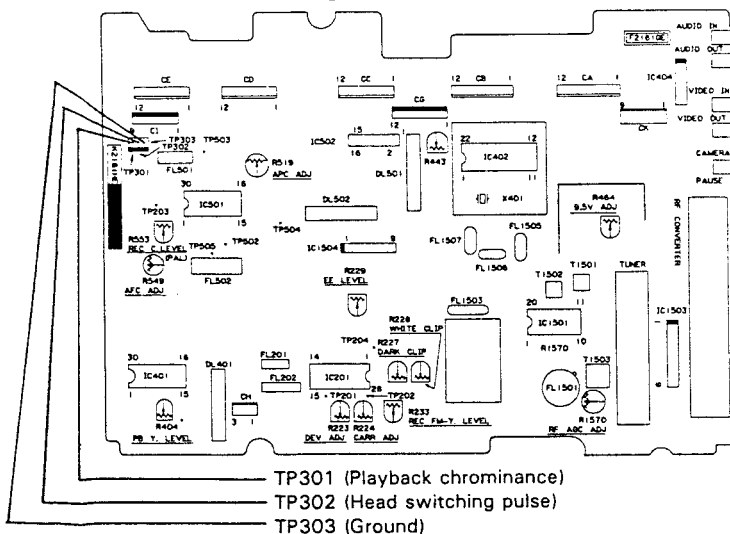


Figure 1-21.

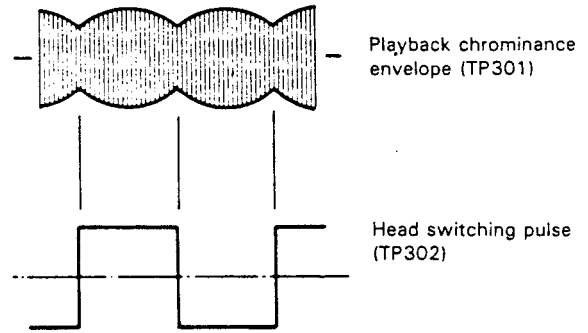


Figure 1-21.

4. When rough adjustment of the tape travel is finished, adjust the audio/control head's height and azimuth.
 - a. Play an alignment of the tape, audio 6 kHz (picture is monoscope), and observe the audio output on an oscilloscope from the audio output terminal.
 - b. Adjust the azimuth adjusting screw ⑤ (3P + 8S) to obtain the maximum audio output level.
 - c. Slowly rotate the audio/control head's height adjusting hexagon nut ③ by the specified box driver (JiGDRIVER110-7) to obtain the maximum audio output level.
 - d. After the height adjustment, play the alignment tape, audio 6 kHz monoscope, and perform adjustment stated in 4-b. above. After adjustment, apply screwlock to the setscrews and nuts to fix.
5. After the audio/control head adjustment, proceed to final tape travel adjustment and X-position adjustment.
 - a. Connect as stated in 3-a.
 - b. Play an alignment tape (VR6CPSV).
 - c. Observing the envelope on the oscilloscope, finely adjust the guide roller height.

Rotate the tracking control clockwise and counterclockwise to adjust the guide roller so as to attain the best flatness of envelope. If the video tape deviates up or down the helical lead, the playback chrominance envelope waveform is as shown in Fig. 1-22. Attain the best flatness of envelope, following the procedure shown in Fig. 1-22.

	When the tape is loose above the helical lead position.		When the tape is close to the helical lead position.	
	Drum inlet	Drum outlet	Drum inlet	Drum outlet
When the tracking control is turned clockwise				
When the tracking control is turned counterclockwise				
Adjustment procedures	Lower the guide roller (at the drum inlet) by turning it clockwise to make flat the envelope.	Lower the guide roller (at the drum outlet) by turning it clockwise to make flat the envelope.	First raise the guide roller (at the drum inlet) by turning it counterclockwise to have the tape float above the helical lead position, then turn the guide roller clockwise to make flat the envelope.	First raise the guide roller (at the drum outlet) by turning it counterclockwise to have the tape float above the helical lead position, then turn the guide roller clockwise to make flat the envelope.

Figure 1-22.

Notes:

The above adjustment is made at the switching pulse high channel side (See Fig. 1-21).

The broken lines represent the envelope waveform when up-down deviation is maximum.

After adjustment, finally tighten the setscrew of the guide roller.

Again play an alignment tape (VRōCPSV) (in unloading mode), and check that the envelope of playback chrominance envelope signal is normal.

- d. After tape travel adjustment, adjust the X-position. Set the playback mode tracking control to the preset position, rotate the X-position adjusting nut shown in Fig. 1-23 with the X-position adjusting screwdriver so as to obtain the maximum envelope of switching pulse (Low channel), and adjust the positions of the audio/control head. After the X-position adjustment, adjust the switching point to $6.5 \pm 0.5H$. Check the flatness of envelope and sound by self-recording.

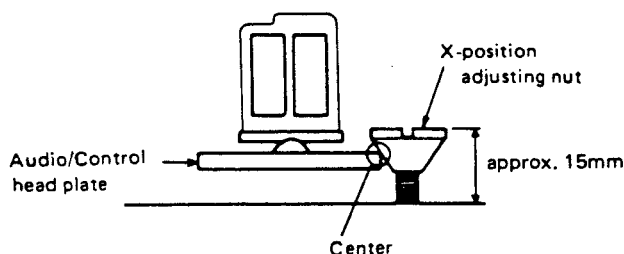


Figure 1-23.

REPLACEMENT OF UPPER DRUM

Note:

The engagement between the disk (outer diameter) and the upper drum (inner diameter) is very accurate in the order of microns, and due care should be paid to their replacement. Even a slight entry of foreign matter will affect the accuracy of their reassembly.

Replacement

1. Unsolder the leads ① to ⑧ and remove them.
2. Remove two screws ⑨ [brass screws (W3P + 9S) with plain washer] by using a philips screwdriver.
3. Withdraw the upper drum with care not to allow it to be tilted, and replace it. Do not damage the outer surface of the disk. For withdrawal of the upper drum, use the jig (specialized for removing the upper drum) shown in Fig. 1-24.

Notes:

1. Avoid touching the drum surface with bare hands.
2. Do not hit on the screws, when driving them in.

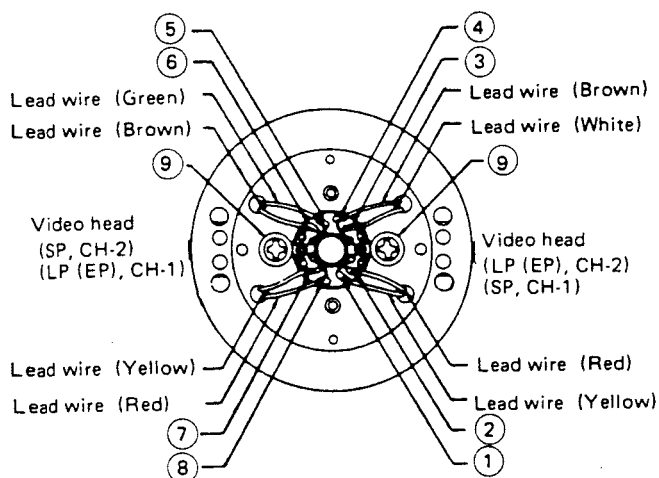


Figure 1-24.

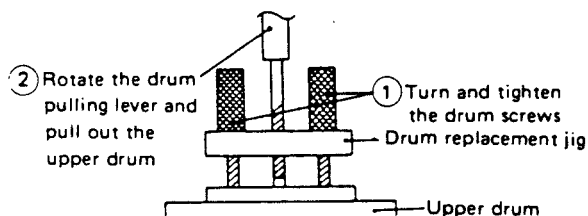


Figure 1-25.

Reassembly

1. Set in place the new upper drum as shown in Fig. 1-28, and arrange the leads to be at their specified positions.

Notes:

1. Before replacement the upper drum, check that there are no scratches or dust on the edge or the outer surface of the disk.
2. Before replacing, the upper drum, check that there are no scratches or dust on the edge or the inner surface of the upper drum.
3. On assembling these parts, slowly insert the upper drum into the disk with the utmost care, so that the upper drum will not be tilted.
4. When assembling these parts, do not allow foreign matter to come between them.
5. Do not use excessive force when driving in the screws.

2. Fasten the upper drum with two screws ⑨.

3. Solder the leads ① to ⑧ at their respective positions.

Note:

Soldering should be performed quickly and carefully without touching the adjoining patterns.

4. After the replacement, be sure to check the tape travel and the followings.
 - a. Adjustment of the playback switching point.
 - b. Adjustment of the playback amplifier.
 - c. Checking and adjustment of the X-position.
 - d. Checking and adjustment of the tape travel at SP mode.

REPLACEMENT OF THE MECHANISM CONTROL UNIT

Removal

1. Remove the cam switch leads from the reel sensor PWB.
2. Remove the E-ring.
3. Remove three B-tight screws.
4. Holding up the mechanism control unit angle, detach it from the main chassis.

Reassembly

1. Remove the slit washer and relay gear B.
2. Align the shifter A and brake drive lever with each other.
(There is an alignment hole on the main chassis, and each of the shifter A and brake drive lever is also given an alignment hole. Use these holes for alignment of the parts; to facilitate this, remove the main brake spring.)
3. Remove the tension arm spring, and rotate the loading gear A and loading gear B fully in the arrow direction to get the unit in the unloading mode.
4. Rotate the brake cam of the mechanism control unit angle in the arrow direction, and bring the center of the alignment hole of the segment gear to that of the alignment hole of the supporting angle.
5. Attach the mechanism control unit angle to the main chassis: to facilitate this, move the shifter A rightward.
6. Secure the three B-tight screws.
7. Fit the E-ring.
8. Arrange the cam switch leads on the reel sensor PWB.
9. Fit the relay gear B and slit washer.
10. Replace the main brake spring and other springs to their original positions.

Notes:

1. When tightening the B-tight screw (LX-HZ3027GEFD), do not give it undue force with more than the specified torque. Or the screw threads of the boss may be crushed.
2. After the reassembly, check for proper alignment of each part and see that the mechanism is normally functioning in each mode.

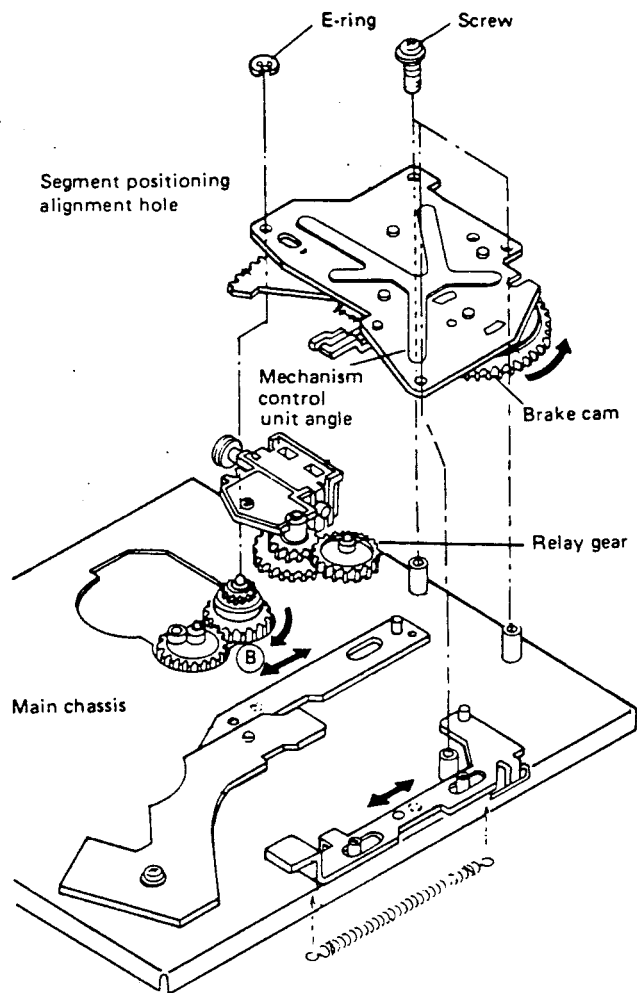


Figure 1-26.

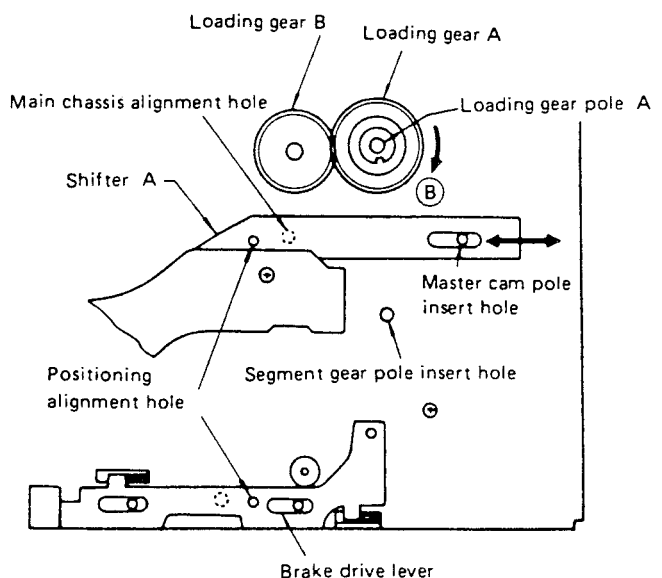


Figure 1-27.

REPLACEMENT OF CAM SWITCH

Removal

1. Remove the slit washer from the mechanism control unit angle and detach the brake cam.
2. Remove the cam switch from the mechanism control unit angle.

Note:

Keeping the clip of the cam switch in the arrow direction, remove the cam switch from the mechanism control unit angle.

Reassembly

1. Attach the cam switch to the brake cam.
2. Set the brake cam and cam switch assemblies on the mechanism control unit angle.

Note:

At the time, align the positioning mark (A) of the master cam and the positioning mark (B) of the brake cam with each other, and allow the torque change lever to come into the groove of the brake cam.

3. Attach the slit washer to the pole of brake cam.

Notes:

1. After the reassembly, rotate the brake cam in either direction to see that the torque change lever is in the groove of the brake cam.
2. When replacing the master cam and/or brake cam, never fail to apply grease to its groove.

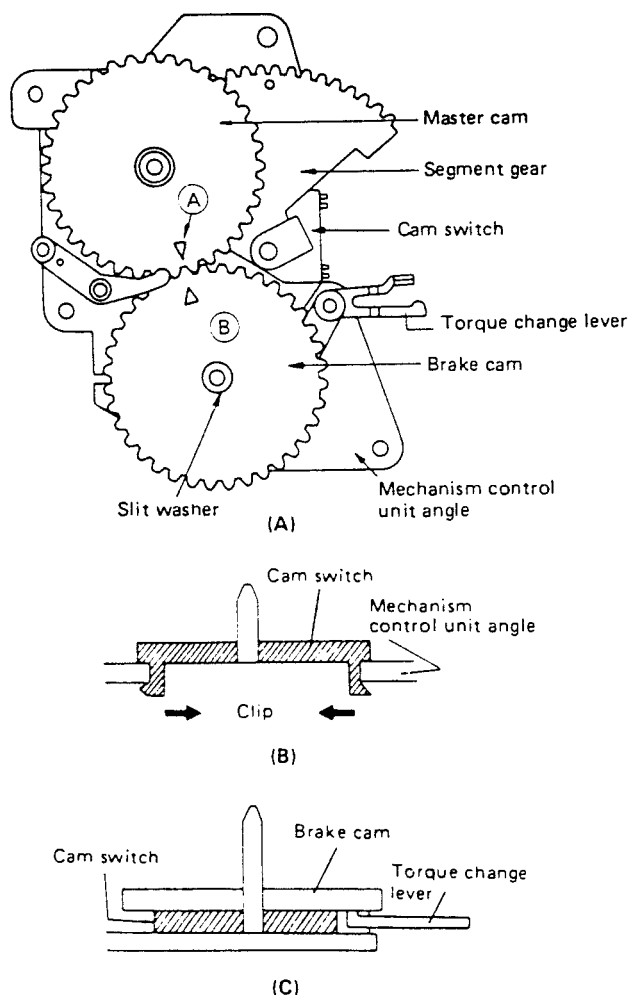


Figure 1-28.

REPLACEMENT OF CAPSTAN DD (Direct Drive) MOTOR

Removal

1. Remove the lead wire connector from the capstan DD (direct drive) motor control PWB. When removing the cable from the PWB, hold the PWB with your hand so that it won't be damaged with the shock resulting from the removal.
2. Remove the B-tight screw which secure the capstan DD motor control PWB with the main chassis.
3. Remove the cup tight screw which secure the capstan DD motor heat sink plate with the main chassis.
4. Remove three screws 2.6P + 5.5S (S. Cup)(LX-HZ3036GEFD) and detach the capstan DD motor from the main chassis.

Reassembly

1. Position the capstan DD motor on the main chassis with care not to allow the capstan shaft to hit the main chassis. Then secure the capstan DD motor and main chassis with the three screws 2.6P + 5.5S(S.Cup)(LX-HZ3036GEFD).
2. Set the capstan DD motor control PWB on the main chassis, and secure them with the B-tight screw.
3. Set the capstan DD motor heat sink plate on the main chassis, and secure them with the cup tight screw.
4. Connect the lead wire connector to the capstan DD motor control PWB.

Notes:

1. After installing the new capstan DD motor, be sure to let it run.
2. Check and adjust the servo circuit.
3. When tightening the B-tight screw, do not give it undue force with more than the specified torque. Or the screw threads of the boss may be crushed.

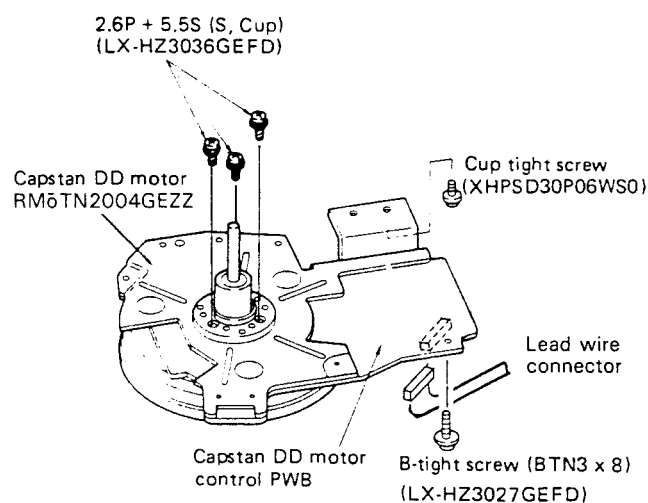


Figure 1-29.

CHECKING OF THE UNIVERSAL BRAKE LEVER

Checking

1. Remove the cassette housing.
2. Press the play button to set the unit to playback mode, and remove the power cord.
3. Remove the reel idler from the take-up reel disk, and set the torque gauge.
4. Slowly rotate the torque gauge so that the reel disk and torque gauge pointer turn with the equal speed, and check that the set value is as specified (within $30 \pm 10 \text{ g.cm}$).

REPLACEMENT OF THE LOADING MOTOR

Replacement

1. Remove four screws (XEBSD40P16000) securing the main chassis to the bottom cabinet.
2. Disconnect the drum DD motor lead connector and the loading motor relay lead NF connector.
3. Remove the loading belt.
4. Remove the cup-tight screw (XHPSD30P08WSO) (6). Tilt the main chassis for easy removal.
5. Remove two screws (XBPSD30P05J00) (2) and remove the loading motor from the loading motor holder.
6. Remove the loading motor PWB (5).
7. Replace the loading motor along with the pulley.

Notes:

1. Check that the space between the motor and the loading motor pulley is $4.5 \pm 0.1 \text{ mm}$.
2. After installing the loading motor, be sure to rotate the loading motor, check for smooth movement and recheck the height checking and adjustment of reel disks and also the adjustment of tape travel (see page 23).

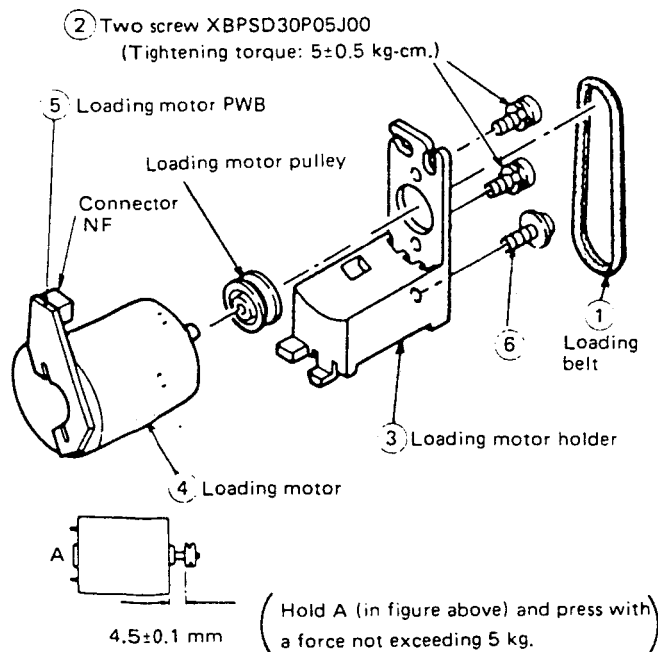


Figure 1-30.

REPLACEMENT OF DD (Direct Drive) MOTOR

Removal

1. Remove two screws (1), using a philips screwdriver, which hold the DD rotor assembly.
2. Remove the DD rotor assembly by pulling it straight out.
3. Remove three brass screws (2), using a philips screwdriver, which hold the DD stator assembly.
4. Remove the DD stator assembly by pulling it straight out.

Assembly

1. Place the DD stator assembly on top of the lower drum.
2. Secure the DD stator with the three brass screws (2) by using a philips screwdriver.

Note:

Be careful not to scratch the core, winding or hall element.

3. Install the DD rotor assembly onto the drum shaft.

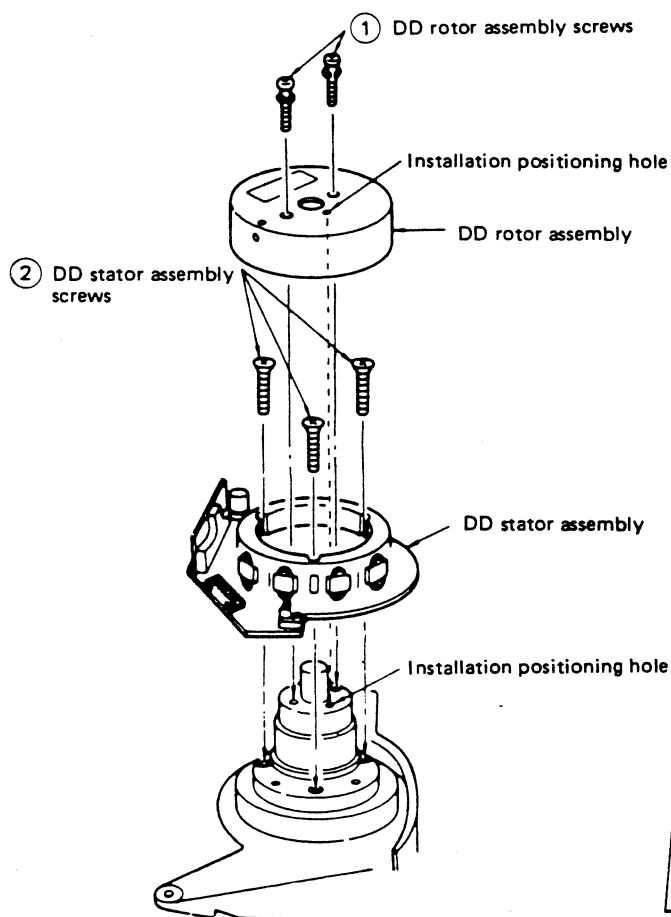
Note:

Press it down straightly and observe it's setting direction as shown in Fig. 1-31.

4. Secure the DD rotor assembly by the screw (1).
5. Apply screw-lock to the screws (1).
6. After the replacement of DD motor adjust the playback switching point.

Notes:

1. Be careful not to damage the upper drum or the video head.
2. Do not let tools on the DD rotor assembly contact or hit the hall element.



Note 1: Secure the DD rotor assembly so that the installation positioning holes in the DD rotor assembly and lower drum match.

Figure 1-31.

ADJUSTMENT OF PLAYBACK SWITCHING POINT

Caution:

This mode is applicable to PAL system, and it is needed to prepare alignment tape, PAL (VRōCPSV), for adjustment of the playback switching point.

Adjustment

Use an alignment tape (monoscope) to play it back, then adjust R716 (drum phase generator) so that the output is $6.5 \pm 0.5H$.

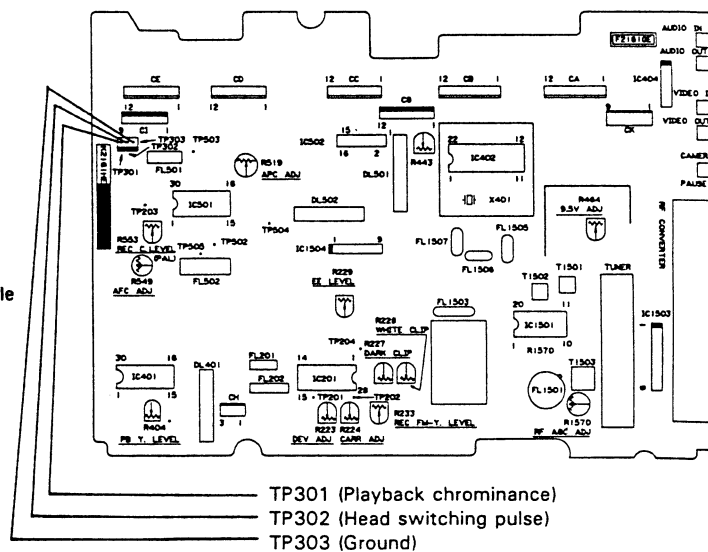


Figure 1-32.

ADJUSTMENT OF ELECTRICAL CIRCUITS

In most cases, necessity for electrical circuits will arise from replacement of mechanical parts including the video head. Before starting adjustment of electrical circuits, check that mechanical operation of the equipment is complete (the mechanism are adjusted completely).

If the equipment fails electrically, locate a defect or defects first of all using instruments. Then repair or replace parts and make adjustment by the procedures described below.

When required instruments are not available, do not move controls indiscriminately.

• Instruments

- Colour monitor TV
- DC regulated power supply
- VTVM
- Oscilloscope
- Audio generator
- Colour bar generator
- Alignment tape
- Frequency counter
- Blank video tape (VHS)

■ ADJUSTMENT OF SERVO CIRCUIT

- Test Points Layout of System Control, Servo, IF Tuner PWB.

SYSTEM CONTROL, SERVO PWB DUNTK2159HE

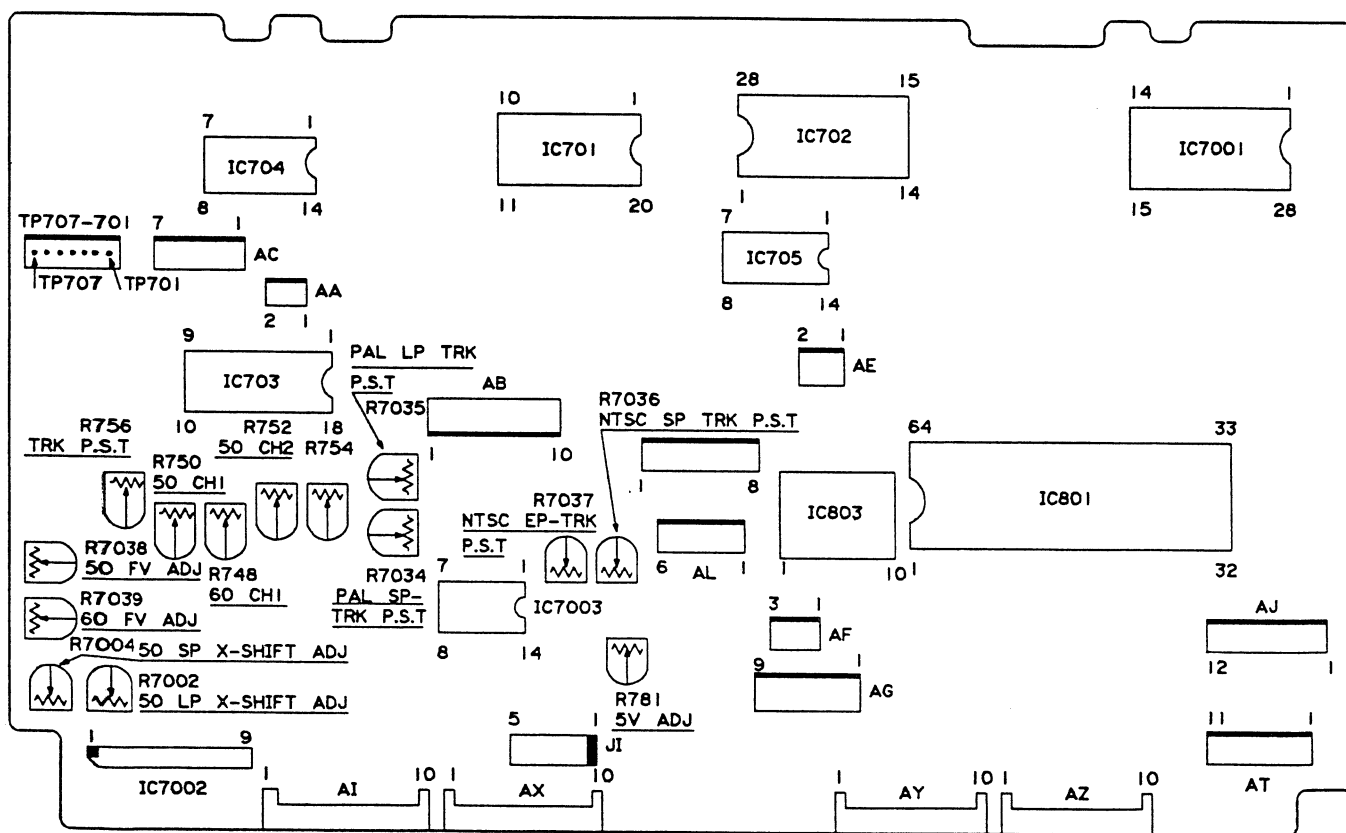


Figure 2-1.

■ ADJUSTMENT OF SERVO TRICK CIRCUIT

Cautions

This adjustment consists of STEP 1 to STEP 14 and should be done, in principle, step by step thoroughly from the beginning to the end. If you, however, want to start the adjustment from the step on the way, observe the following points.

- For performing STEP 1 "Adjustment of PC 5.1V", be sure to check beforehand that both adjustments of Y/C circuit and 9.5V have been properly made.
- STEP 2 "Adjustment of X-position shift time" should be performed prior to taking the procedures for the X-position adjustment during tape travel alignment.
- In STEP 1 "Adjustment of PC 5.1V", if the checking voltage is largely apart from the specified value ($5.1 \pm 0.1V$), that is, if the difference between both values is 0.3V or more, it is needed to take all the procedures from STEP 1 to STEP 14.
- For the CH-1 and CH-2 phase adjustments from STEP 5 to STEP 8, the adjustment should be performed first for PAL system and then for NTSC system.
- For the adjustments of the false vertical sync from STEP 11 to STEP 13, be sure to check beforehand that the CH-1 and CH-2 phase adjustments (from STEP 5 to STEP 8) have been properly made.

STEP 1.

Adjustment of PC 5.1V.

1. Put the unit in the PAL playback mode.
2. Connect a VTVM to TP705 and TP704, and adjust R781 (PC 5V control) so that the VTVM reads $5.1 \pm 0.1V$.

Note:

For the X-position adjustment, be sure to check beforehand that the adjustments of Y/C circuit and 9.5V, PC 5.1V adjustment of servo circuit (STEP 1) and X-position shift time adjustment (STEP 2) have been all properly made.

STEP 2.

Adjustment of X-position shift time

1. Put the unit in the PAL SP record mode (receiving any PAL broadcast signal).
2. Observe the output of TP701 (head switching pulse) and the output of TP707 (record control) with an oscilloscope.
3. Adjust R7004 so that it takes the specified time ($30.2 \pm 1\text{msec}$) from the rising edge of TP701 output (head switching pulse) to the rising edge of TP707 output (record control).

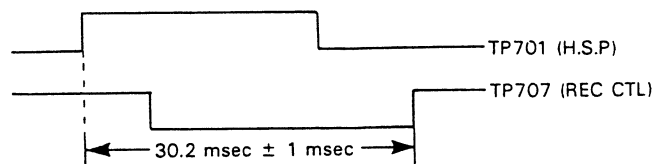


Figure 2-2.

4. Put the unit in the PAL LP record mode.
5. As with the unit in the PAL SP record mode, adjust R7002 so that it takes the specified time ($18.4 \pm 1\text{msec}$) from the rising edge TP701 output (head switching pulse) to the rising edge of TP707 output (record control).

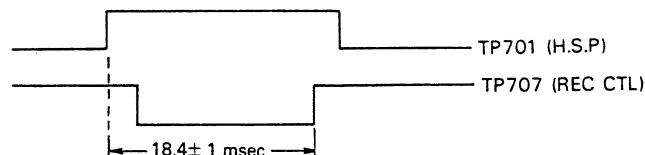


Figure 2-3.

STEP 3.

Adjustment of PAL tracking preset

1. Put the unit in the PAL playback mode, using an alignment tape (VR0CPSV).
2. Observe the output of TP702 (tracking) with an oscilloscope.
3. Adjust R756 (tracking preset control) so that the square-wave output is at the specified level ($20.0 \pm 1.0\text{msec}$) from the rising edge to the falling edge.

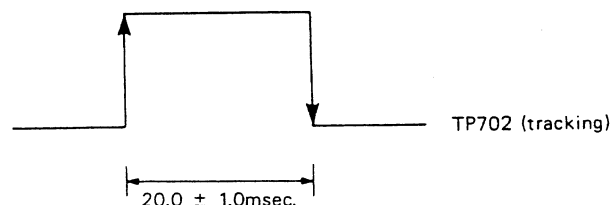


Figure 2-4.

STEP 4.

Checking of NTSC tracking preset

1. Put the unit in the NTSC playback mode, using an alignment tape (VR0ATS).
2. Observe the output of TP702 (tracking) with an oscilloscope.
3. Check that the square-wave output is at the specified level ($16.7 \pm 1.0\text{msec}$) from the rising edge to the falling edge.

Note:

If the specified level is not here obtained, readjust the PAL tracking preset in STEP 3 above and recheck the value in this step.

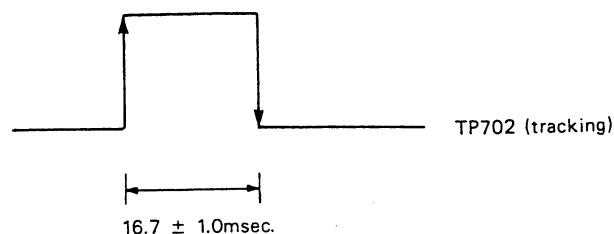


Figure 2-5.

STEP 5.**Adjustment of PAL CH-1 and CH-2 phase (SP mode)**

1. Put the unit in the PAL playback mode, using an alignment tape (VR0CPSV).
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Using the plus sync slope of oscilloscope, adjust R750 (3H SP CH-1 phase control) so that the output level is at $6.5 \pm 0.5H$.
4. Using the minus sync slope of oscilloscope, adjust R752 (3H SP CH-2 phase control) so that the output level is at $6.5 \pm 0.5H$.

STEP 6.**Adjustment of PAL CH-1/CH-2 phase relative error**

1. Put the unit in the PAL playback mode, using an alignment tape (VR0CPSV).
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Exchange the plus sync slope and minus sync slope of oscilloscope with each other, and check that the variation at the front of the vertical sync signal is within $\pm 0.5H$.
4. If the variation of CH-1 and/or CH-2 is not out of the specified range ($\pm 0.5H$), readjust the phase of CH-1 or CH-2 whichever has the larger variation.

Note:

If the CH-1/CH-2 phase relative error is greatly out of the specified range ($\pm 0.5H$), there is a trouble that the reproduced picture fluctuates vertically in the video search mode.

STEP 7.**Adjustment of NTSC CH-1 and CH-2 phase (SP mode)**

1. Put the unit in the NTSC playback mode, using an alignment tape (VR0ATSV).
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Using the plus sync slope of oscilloscope, adjust R748 (2H SP CH-1 phase control) so that the output level is at $6.5 \pm 0.5H$.
4. Using the minus sync slope of oscilloscope, adjust R754 (2H SP CH-2 phase control) so that the output level is at $6.5 \pm 0.5H$.

STEP 8.**Adjustment of NTSC CH-1/CH-2 phase relative error**

1. Put the unit in the NTSC playback mode, using an alignment tape (VR0ATSV).
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Exchange the plus sync slope and minus sync slope of oscilloscope with each other, and check that the variation at the front of the vertical sync signal is within $\pm 0.5H$.

4. If the variation of CH-1 and/or CH-2 is out of the specified range ($\pm 0.5H$), readjust the phase of CH-1 or CH-2 whichever has the larger variation.

Note:

If the CH-1/CH-2 phase relative error is greatly out of the specified range ($\pm 0.5H$), there is a trouble that the reproduced picture fluctuates vertically in the video search mode.

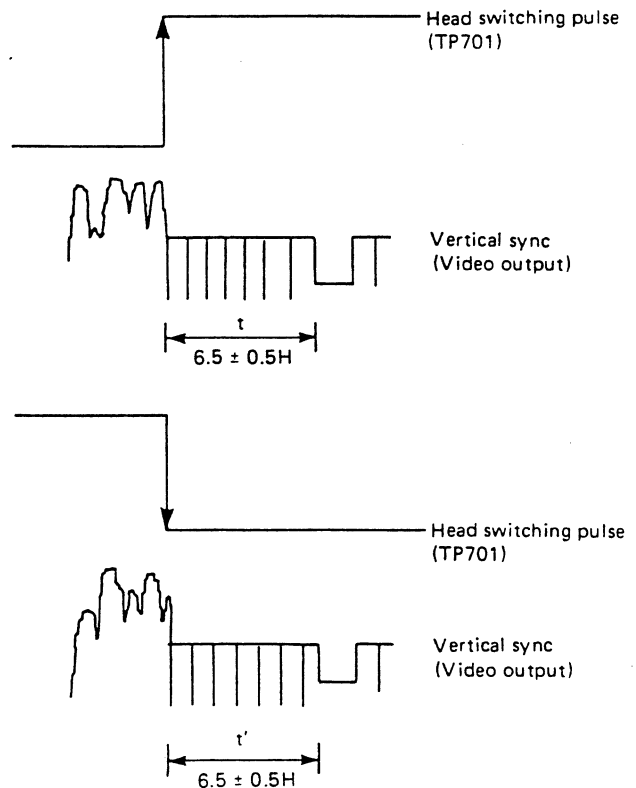


Figure 2-6.

STEP 9.**Checking of PAL recording phase (SP mode)**

1. Record a PAL video signal on an E-180 tape, and play it back.
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Check that the output level is at $6.5 \pm 2.0H$.

STEP 10.**Checking of NTSC recording phase (SP mode)**

1. Record a NTSC video signal on an E-180 tape, and play it back.
2. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope.
3. Check that the output level is at $6.5 \pm 2.0H$.

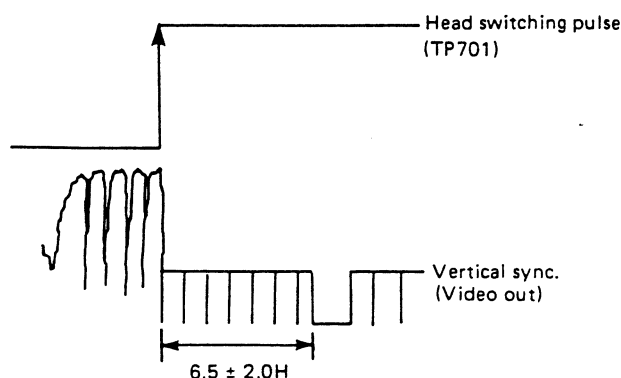


Figure 2-7.

STEP 11.**Adjustment of PAL false vertical sync in the slow/still mode.****Note:**

Before this adjustment, be sure to check that the adjustment of PAL CH-1/CH-2 relative error in STEP 6 has been properly done.

1. Put the unit in the PAL playback mode, using an E-180 tape.
2. Put the unit in the PAL still mode.
3. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope, and adjust R7038 (3H slow/still FV sync. control) so that the output level is shown in Fig. 2-8.
4. Adjust R7038 so that there is the least of noise on TV monitor.

STEP 12.**Checking of PAL false vertical sync in the video search mode.**

1. Record a PAL video signal on an E-180 tape, and play it back.
2. Put the unit in the video search mode.
3. Check that the horizontal raster does not move up and down so noticeably on TV monitor.

STEP 13.**Adjustment of NTSC false vertical sync in the slow/still mode****Note:**

Before this adjustment, be sure to check that the adjustment of NTSC CH-1/CH-2 relative error in STEP 8 has been properly done.

1. Record a NTSC video signal on an E-180 tape, and play it back.
2. Put the unit in the still mode.
3. Observe the output of TP701 (head switching pulse) and video output with an oscilloscope, and adjust R7039 (2H slow/still FV sync. control) so that the output level is as shown in Fig. 2-8.
4. Adjust R7039 so that there is the least deviation of noise on TV monitor.

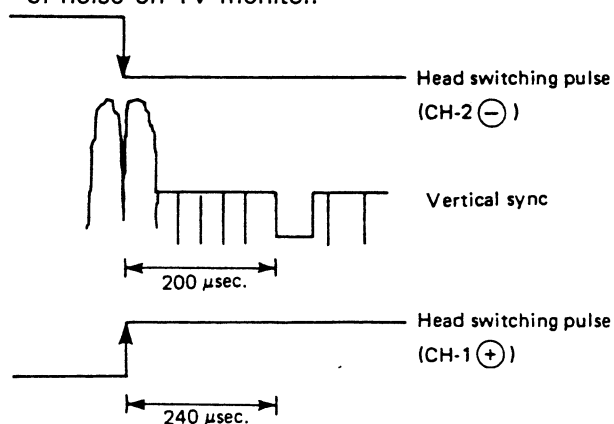


Figure 2-8.

STEP 14.**Adjustment of slow/still tracking preset****Note:**

- Use of a remote control transmitter is needed to put the unit in the slow mode.
- Before this adjustment of slow/still tracking preset, be sure to check that the slow tracking control located on the front panel has been set at its center click position.

(a) PAL SP mode:

1. Placing the unit in the PAL SP mode, record a video signal and play it back, then put the unit in the slow mode with use of a remote control transmitter.
2. Adjust R7034 so that there appear no noises on the monitor screen.

(b) PAL LP mode:

1. Placing the unit in the PAL LP mode, record a video signal and play it back, then put the unit in the slow mode with use of a remote control transmitter.
2. Adjust R7035 so that there is the least deviation of noise on the monitor screen.

(c) NTSC SP mode:

1. Placing the unit in the NTSC SP mode, record a video signal and play it back, then put the unit in the slow mode with use of a remote control transmitter.
2. Adjust R7036 so that there is the least deviation of noise on the monitor screen.

(d) NTSC EP mode:

1. Placing the unit in the NTSC EP mode, record a video signal and play it back, then put the unit in the slow mode with use of a remote control transmitter.
2. Adjust R7037 so that there is the least deviation of noise on the monitor screen.
 - If there appear noises on the monitor screen, adjust the control so that they move up and down first and then the picture will be stable for the viewer's preference.

■ ADJUSTMENT OF Y/C CIRCUIT
Adjustment of E-E level
Note:

The video output must be terminated with a resistor of 75 ohms.

- Put the unit in the stop mode and connect a VTVM to TP402, and adjust R464 so that the VTVM reads the power voltage of $9.5 \pm 0.1V$.

1. Put the unit in the PAL SP record mode, using an E-180 tape.
2. Apply a colour bar signal (stair-step waveform) to the unit. And observe the video output with an oscilloscope.
3. Adjust R229 (E-E level control) so that the level becomes $1.0 \pm 0.05V_{p-p}$.

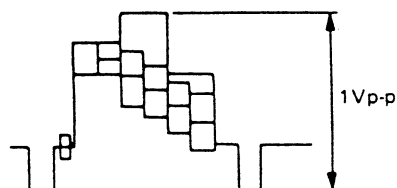


Figure 2-9.

• Test Point Layout

(Y/C PWB) —DUNTK2161HE—

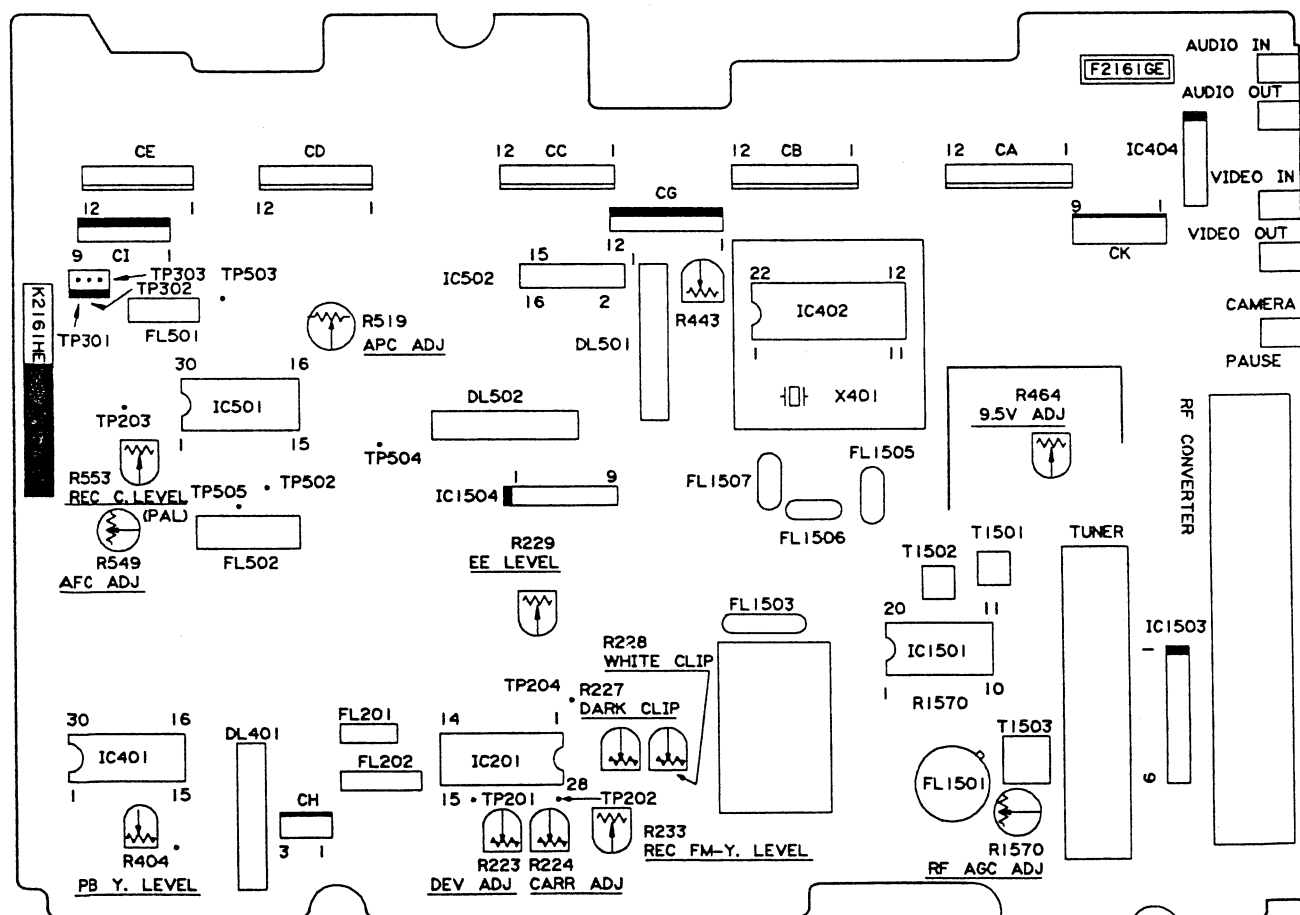


Figure 2-10.

Adjustment of FM carrier and deviation

Notes:

- Do not perform this adjustment except after replacement of IC201 or when the carrier control (3.8MHz) or deviation control (1.0MHz) has been adjusted improperly.
 - Before this adjustment, make sure that the E-E level and playback brightness level have been adjusted as specified.
- Set the input selector switch in the AUX mode. (with the AUX terminal given no signal).
 - Put the unit in the PAL SP record mode.
 - Connect a frequency counter to TP202, and adjust R224 (carrier control) so that the counter reads $3.8 \pm 0.05\text{MHz}$.
 - Apply a colour bar signal (stair-step waveform), then record and play it back.
 - Connect a 75 ohm resistor between the video output and ground, and observe the video output with an oscilloscope.
 - Adjust R223 (deviation control) so that the video playback level becomes $1.0 \pm 0.05\text{Vp-p}$. If the level is below 0.95Vp-p , turn the R223 counterclockwise. If the level is over 1.05Vp-p , turn the R223 clockwise.

Adjustment of dark clip and white clip

- Put the unit in the PAL SP record mode, using an E-180 tape.
- Apply a colour bar signal (stair-step waveform) to the unit.
- Observe the output of TP201 with an oscilloscope, and adjust R228 (white clip control) so that white output overshoot is within $80 \pm 5\%$, and then adjust R227 (dark clip control) so that dark output overshoot is within $50 \pm 5\%$.

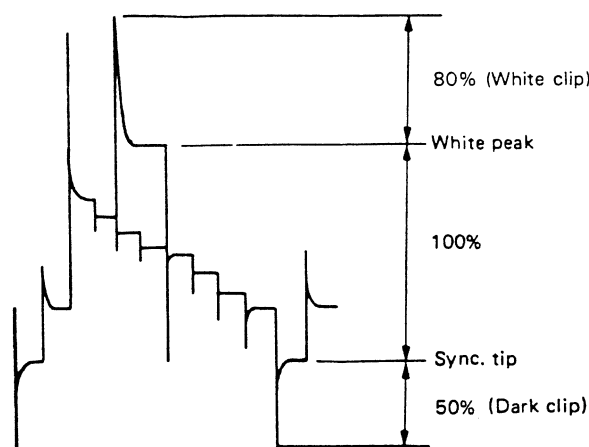


Figure 2-11.

Adjustment of automatic phase control (APC)

- Put the unit in the PAL SP playback mode, using an alignment tape (VR0CPSV).
- Apply a colour bar signal (stair-step waveform) to the unit, and connect a frequency counter to TP504.
- Adjust R517 (APC control) so that the counter reads 4.433619 MHz .

Adjustment of automatic frequency control (AFC)

Note:

Connect a short clip between TP502 and TP503.

- Put the unit in the PAL SP record mode, using an E-180 tape.
- Apply a colour bar signal (stair-step waveform) to the unit, and connect a frequency counter to TP505.
- Adjust R549 (AFC control) so that the counter reads $625 \pm 5\text{kHz}$.

Adjustment of record current

a) In the case of PAL 4.43MHz

Note:

Before the adjustment, turn R233 (record luminance level control) to minimize the record current.

- Put the unit in the PAL SP record mode, using an E-180 tape.
- Apply a colour bar signal to the unit.
- Connect the plus sync slope of oscilloscope to TP31 and the minus sync slope to TP32 and observe the output waveforms available there.
- Adjust R553 (record chroma level control) so that the output level is within $20.0 \pm 2.0\text{mV}$.

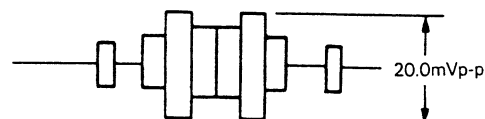


Figure 2-12.

b) In the case of NTSC 3.58MHz (refer to chroma circuit, Fig. 2-17)

Note:

Before the adjustment, turn R233 (record luminance level control) to minimize the record current.

- Put the unit in the NTSC SP record mode, using an E-180 tape.
- Apply a colour bar signal to the unit.
- Connect the plus sync slope of the oscilloscope to TP31 and the minus sync slope to TP32, and observe the output waveforms available there.

- Adjust R5810 (3.58MHz record chroma level control) so that the output level is within $25.0 \pm 2.0\text{mV}$.

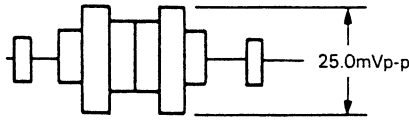


Figure 2-13.

c) In the case of SECAM
(refer to chroma circuit, Fig. 2-17)

Note:

Before the adjustment, turn R233 (record luminance level control) to minimize the record current

- Put the unit in the SECAM SP record mode, using an E-180 tape.
- Apply a colour bar signal to the unit.
- Connect the plus sync slope of oscilloscope to TP31 and the minus sync slope to TP32 and observe the output waveforms available there.
- Adjust R5813 (SECAM record chroma level control) so that the output level is within $16 \pm 2\text{mV}$.

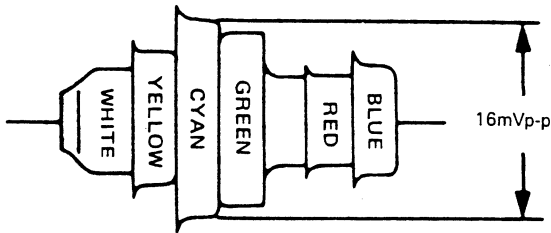


Figure 2-14.

d) Adjustment of record luminance level

- Put the unit in the PAL SP playback mode, using an E-180 tape.
- Apply a colour bar signal to the unit.
- Connect the plus sync slope of oscilloscope to TP31 and the minus sync slope to TP32 and observe the output waveforms available there.
- Adjust R233 (record luminance level control) so that the output level is within $100 \pm 10\text{mV}$.

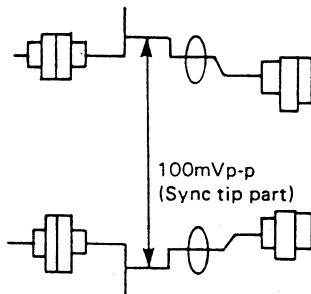


Figure 2-15.

Adjustment of playback luminance level

Note:

The video output must be terminated with a resistor of 75 ohms.

- Put the unit in the PAL SP playback mode, using an alignment tape (VR0CPSV).
- Observe the video output with an oscilloscope.
- Adjust R404 (playback luminance level control) so that the output level is $1.0 \pm 0.05\text{Vp-p}$.

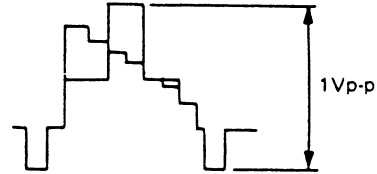


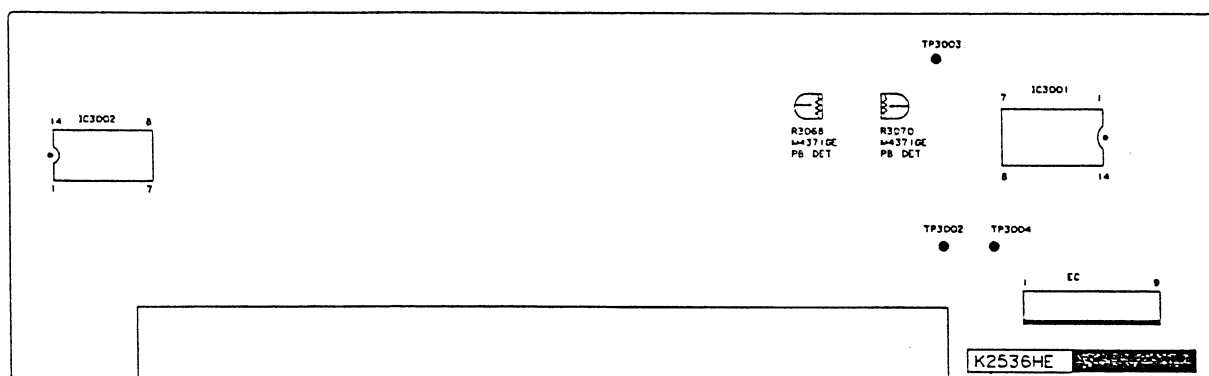
Figure 2-16.

Adjustment of video level (NTSC trick mode)

- Record an NTSC colour signal using an E-180 tape and play it back, then put the unit in the still mode.
- Observe the output of TP301 (head switching pulse) and video output with an oscilloscope.
- Adjust R443 so that there is a video level difference of $\pm 0.1\text{V}$ between Channel-1 output (head switching pulse's High level) and Channel-2 output (head switching pulse's Low level).
- If the colour flicker is so noticeable on the TV monitor, finely adjust R443 so that there is the least deviation of flicker on the screen.

ADJUSTMENT OF SYSTEM DETECTOR CIRCUIT

- Test point layout

**Adjustment of recording system detector**

1. Put the unit in the PAL SP record mode, using an E-180 tape.
2. Apply a colour bar signal to the unit.
3. Connect a VTVM between TP3001 (⊕ side) and TP3003.
4. Adjust R3070 (rec. system detector control) so that the VTVM reads $0.35 \pm 0.05\text{VDC}$.

Adjustment of playback system detector

1. Put the unit in the PAL SP playback mode, using an alignment tape (VR0CPSV).
2. Connect a VTVM between TP3002 (⊖ side) and TP3004.
3. Adjust R3068 (playback system detector control) so that the VTVM reads $0.5 \pm 0.05\text{VDC}$.

ADJUSTMENT OF CHROMA CIRCUIT

• Test point layout

(CHROMA PWB)

—DUNTK2160HE—

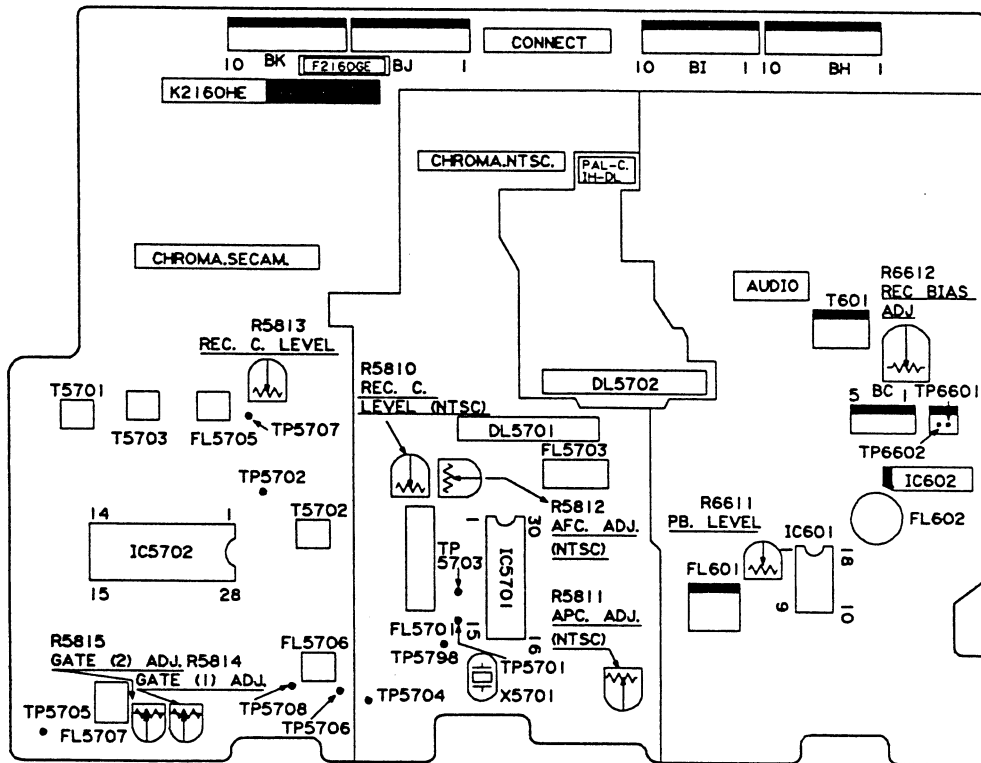


Figure 2-17.

■ ADJUSTMENT OF NTSC 3.58 CIRCUIT

Adjustment of AFC (R5812)

1. Apply a NTSC colour bar signal to the video input terminal.
2. Put the unit in the SP stop mode, and short TP5703 and TP5706.
3. Connect a frequency counter to TP5701 and adjust R5812 so that the counter reads 629 kHz.

Adjustment of APC (R5811)

1. Playback a NTSC tape (pre-recorded) in the SP mode and connect a frequency counter to TP5703.
2. Adjust R5811 so that the counter reads 3.579545 MHz (± 50 kHz).

Adjustment of colour record current (R5810)

1. Connect an oscilloscope to TP301 and TP302 (GND) of the head amplifier, and apply a NTSC colour bar signal to record it.
2. Set R233 (record luminance level control) at the minimum position and adjust R5810 so that the output is 25mVp-p.
3. Return R233 to the position which gives the output of 100mVp-p.

■ ADJUSTMENT OF SECAM CIRCUIT

Adjustment of record bell filter (T5703)

1. Connect an oscilloscope to TP5708.
2. Apply a SECAM colour bar signal to the unit and record it in the SP mode.
3. Adjust T5703 so that the output of chroma signal becomes flat as shown in Fig. 2-18.

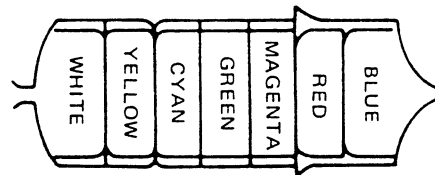


Figure 2-18.

Adjustment of record gate (R5814, R5815)

1. Apply a SECAM colour bar signal to the unit and record it in the SP mode.
2. Connect an oscilloscope to TP5702 and TP5705, and check that the output of chroma signal is as shown in Fig. 2-19.
3. Adjust R5814 and R5815 so that the intervals T_1 and T_2 become $2\mu\text{sec}$ and $4.2\mu\text{sec}$ respectively.

Adjustment of record equalizer (T5702)

Adjust T5702 so that the output at the point ① is as shown in Fig. 2-19.

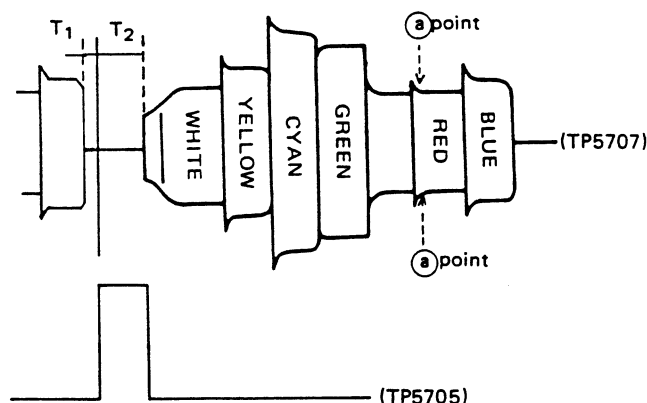


Figure 2-19.

Adjustment of SECAM colour record current (R5813)

1. Connect an oscilloscope to TP301 and TP302 (GND) of the head amplifier, and apply a SECAM colour bar signal to record it in the SP mode.
2. Set R233 (record luminance level control) at the minimum position and adjust R5813 so that the output is 16 mVp-p.
3. Return R233 to the position which gives the output of 100 mVp-p.

Adjustment of playback equalizer (T5701)

1. Playback a SECAM colour tape (pre-recorded) in the SP mode and connect an oscilloscope to TP5708 and TP5705.
2. Adjust T5701 so that the amplitude difference among each chroma signal becomes the least as shown in Fig. 2-20.

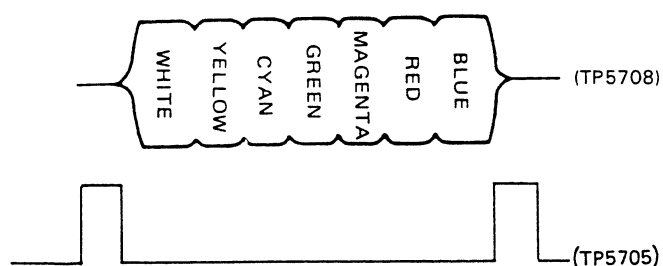


Figure 2-20.

ADJUSTMENT OF TUNER/IF, AUDIO CIRCUIT**■ TUNER IF ADJUSTMENT****Caution:**

Do not perform this adjustment except when either of the tuner, detection coil (T1501) and AFT coil (T1502) is replaced with a new one.

If any one of the above parts is replaced, perform the adjustment as follows.

1. Receive PAL broadcast and turn on AFT switch.
2. Connect an oscilloscope to pin ① of IC1504, and adjust the core belonging to the replaced part so that the burst level of video signal is equal to 1/2 of the horizontal sync level. See Fig. 2-21.
3. Readjust R1570 (RF AGC).

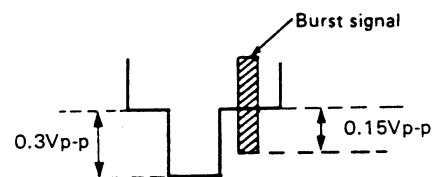


Figure 2-21.

Adjustment of RF AGC

Turn R1570 to the position where the waveform of horizontal sync signal shown in Fig. 2-21 begins to contract.

■ AUDIO ADJUSTMENT**Adjustment of record bias current (R6612)**

1. Connect a VTVM to TP6601(−) and TP6602(+).
2. Adjust R6612 so that the VTVM reads 2.3 mV.

Adjustment of playback audio level (R6611)

1. Connect a VTVM to the audio output terminal and playback an alignment tape (VR0CPSV).
2. Adjust R6611 so that the VTVM reads −9 dBm.

Adjustment of NTSC audio trap

1. Receive NTSC broadcast signal.
2. Connect an oscilloscope to pin ⑮ of IC1501.
3. Turn T1501 so that there appears the least deviation of noise on the oscilloscope (for the horizontal sync of video signal) in the audio mode.

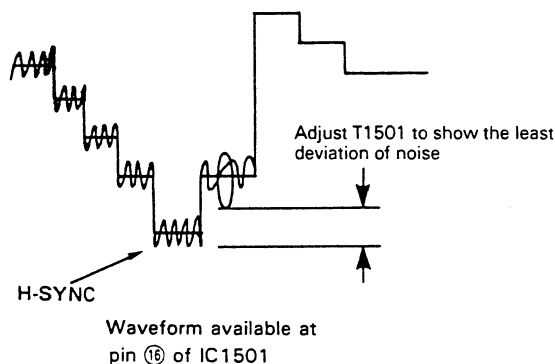


Figure 2-22.

■ ADJUSTMENT OF TIMER CIRCUIT

Note:

This model is equipped with a crystal oscillator (32 kHz) type timer.

The following adjustment is needed when the timer IC has been replaced or if there is a time count error for some reason. (Notice that the unit has been accurately factory-adjusted. Do not attempt to readjust this circuit if not needed.)

Before starting the adjustment, make the following connections with the test point connector on the printed face of the timer PWB.

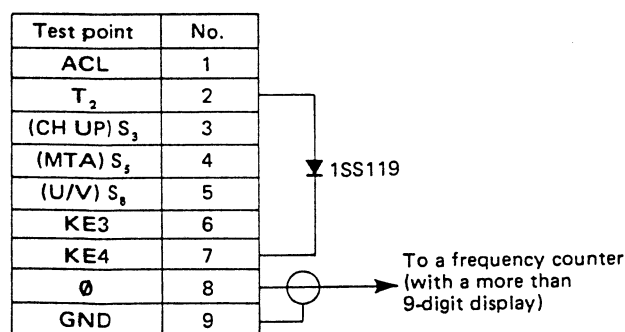


Figure 2-23.

Timer adjustment

1. Couple the connector in position on the timer PWB.
2. Press the ACL switch on the timer PWB.
(Now the digitron display will turn off.)
3. Adjust C5009 (trimming capacitor) so that the frequency counter may read the values listed below.
4. Finally disconnect the connector from the timer PWB.
(Flashing → Timer preset)

Condition	Adjustment value	Remarks
10–15°C	16383.962 ± 0.019 Hz	(Pace) –0.2 ± 0.1 sec/day
Higher than 15°C	16384.019 ± 0.019 Hz	(Pace) +0.1 ± 0.1 sec/day

Post-adjustment checking

Half a day to three days after the adjustment, check the accuracy for extra surety.

SERVO TRICK MOTION CIRCUIT

OUTLINE

The servo trick motion circuit of VC-779Z utilizes the latest mechanism of digital servo system in which the direct drive motor is used as capstan motor.

The double-azimuth 4-head system, additionally introduced, makes the video search (SP speed) noise-free and the still pictures much clearer.

The features of the system are as follows.

1. During the video search operation, the tape is driven by the capstan motor at the stabilized speed. The brushless motor can attain extremely long service life and excellent reliability.
2. The use of direct drive capstan motor has enabled the accurate control of speed, acceleration and timing of the running tape in the SLOW and Frame Advance modes, with almost no noise accompaniment.
3. The VC-779Z provides LP (long play)-mode tape recording and playback in addition to standard-mode ones. The LP mode achieves tape recording and playback three times longer than the standard mode when the VC-779Z operates on the NTSC system and, twice longer when it operates on the PAL, SECAM, or MESECAM system. Also, this mode allows the VC-779Z to playback NTSC double mode recorded tapes.

The servo block diagram is shown in Figure 3-3.

OPERATIONS

1. Servo circuit

The major operations are carried out by IC702 (RH-XO162GEZZ) Servo Main.

IC701 (AN6359N) performs I/O (Input/Output) processing with the capstan motor, while IC703 (AN6346N) performs I/O processing with the drum motor.

2. Drum AFC Loop

The signal from the drum frequency generator inside of the drum motor is applied to pin ⑩ of IC704, where the signal is amplified and sent again to pin ⑥ of IC704. The signal is then shaped to the pulse whose amplitude is approx 0V at Low level and approx 5V at High level. The shaped pulse from the drum frequency generator pulse is applied to pin ②④ of IC702. It is then sent to the digital speed comparator together with the reference value of each mode which has been compensated in terms of the drum speed in NTSC, PAL or Video Search mode. The signal resulted from this comparison is sent into the PWM (pulse width modulator). The PWM output from pin ②⑧ of IC702 has the square wave of approx. 14 kHz in NTSC mode and 17.3 kHz in PAL mode.

When the signal from the drum frequency generator is in conformity with the target signal, the PWM output is the pulse of 50% duty. The four inverters (each of IC705) perform the polarity adjustment (reversing) which is needed to control each of the drum servo capstan servo APC servo and AFC servo circuits.

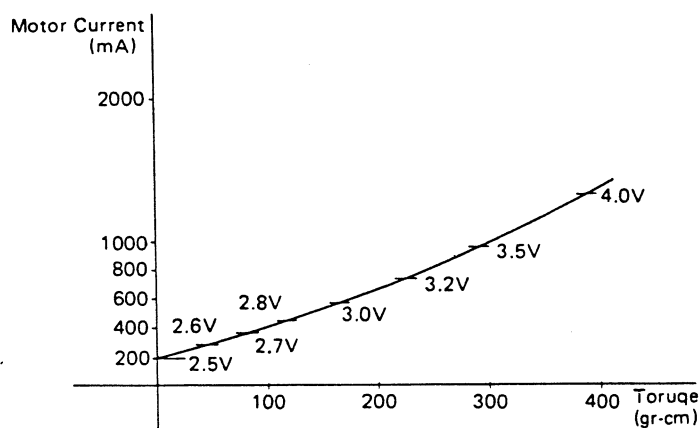


Figure 3-1 VC limit voltage, capstan motor current and torque characteristics

The PWM pulse reversed in polarity is sent to the low pass filter and converted to DC voltage in proportion to the duty level. The pulse is then amplified in DC at IC704. The drum control voltage present at pin ① of IC704 is converted to a current at R737 and sent to pin ① of the drum motor driver IC (M51721L). The driver IC detects the magnetic field of the rotor with Hall element and makes switching of the current to be sent to the stator coil. At the same time, the control current applied to pin ① of the driver IC is amplified to generate the rotational torque suitable for the loaded torque.

3. Description of Control

When the load on the tape is changed abruptly or when the rotational speed of the drum is slower than it should be during starting of the motor, it is necessary to immediately increase the motor generating torque to raise the rotational speed up to the target. When the rotational speed is lower than target the duty of the PWM pulse from pin ②⑧ of IC702 becomes less than 50%.

The pulse is then reversed at IC705 to increase the DC voltage output of the low pass filter. Accordingly, the voltage at pin ① of IC704 is raised and amplified at the drum motor driver IC to bring the speed up to the target. When the speed is higher than the target, the duty of the PWM pulse from pin ②⑧ of IC702 becomes more than 50%.

The output torque of the motor is reduced in this case to bring the speed down to the target.

4. Drum APC Loop

In the drum APC loop, the reference trapezoidal wave signal is produced digitally during REC mode on the basis of the vertical sync signal from pin ⑤ of IC702. This reference signal is then sent to the digital phase comparator. On the other hand, the head switching pulse, which is produced at IC703 on the basis of the signal sent from the drum pulse generator, is sent to pin ②⑤ of IC702 and to the digital phase comparator. The signal resulted from the digital phase comparison is sent to the pulse width modulator to produce at pin ②⑦ of IC702 the pulse-width-modulated signal which is approx 3.5 kHz in NTSC mode and 4.33 kHz in PAL mode.

The pulse available at pin ②⑦ is reversed by the inverters at pins ①① and ①⑩ of IC705 and converted to the DC voltage as it passes through the low pass filter. This voltage is then added to the error voltage of the drum AFC to be sent out to the drum motor control circuit.

Figure 3-2 shows the timing chart of the servo phase loop. The output pulse from pin ②⑦ of IC 702 has the duty of 50% so far as the control is made with the desired phase. However, the duty of the pulse from pin ②⑦ is reduced when the phase of the drum rotation is lagged behind the target in the

transient process, like the case mentioned in the AFC loop operations.

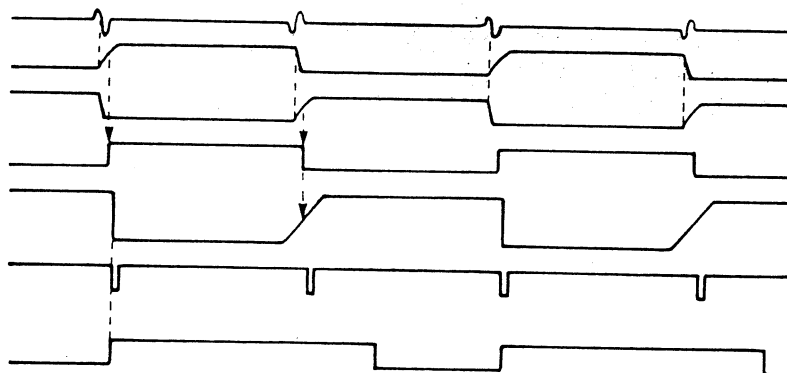
In this case, the duty of the pulse from pin ①⑩ of IC705 becomes high to raise the DC voltage output of the low pass filter. The drum motor is then accelerated to bring the rotational phase to what it should be. In PLAY mode, the reference signal of trapezoidal wave is resulted from the 25Hz or 30Hz reference signal which has been obtained by making frequency division on the clock signal at pin ①⑤ of IC702.

This reference signal of trapezoidal wave is then sent to the phase comparator.

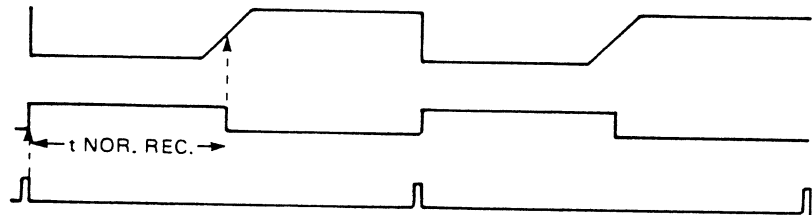
[A] REC MODE

Note 1: Unobservable because of inside timing of IC702.

1. Drum P.G. (IC707 ①②)
2. CH1 MM. (IC703 ①⑤)
3. CH2 MM. (IC703 ①⑥)
4. H.S.W.P. (IC703 ①④)
5. Reference Trapezoidal Wave (Note 1)
6. V-sync. (IC702 ⑤)
7. REC CTL (IC703 ①⑩)
(Refer to X value shift. (Page 6))



8. Capstan Reference Trapezoidal Wave (Product from internal reference signal) (Note 1)
9. T.D.MM. (Note 1)
10. Capstan Pulse Generator (Frequency Division of Capstan Frequency Generator) (Note 1)



[B] PB MODE

1. H.S.W.P. (IC703 ①④)
2. Reference Trapezoidal Wave (Note 1)
3. VSY-2 (IC702 ④)
4. TRACKING (IC703 ①②)
MM
5. Capstan Reference Trapezoidal Wave (Note 1)
6. T.D.MM. (Note 1)
7. PB CTL (Note 1)

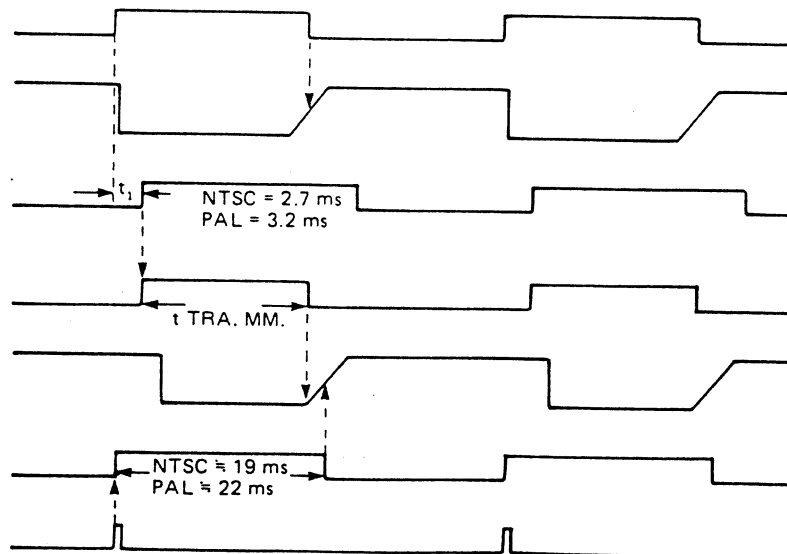


Figure 3-2 Timing chart of drum/capstan phase servo loop

5. Capstan AFC Loop

The signal from the capstan frequency generator head installed on the capstan direct drive motor (hereafter referred to as DD motor) sent to pin ⑮ of IC701, where the signal is further amplified and shaped for frequency division with 1/M. (The value of M is 2 when the VC-779Z is in the PAL 3H, SECAM 3H or MESECAM 3H mode or in the NTSC 2H or NTSC 4H mode; and it is 1 when the VC-779Z is in the PAL 6H, SECAM 6H, MESECAM 6H, or NTSC 6H mode.) The pulse from the capstan frequency generator which has been undergone such frequency division is applied to pin ⑰ of IC702 for the processing of X2, 1/X and 1/2. The processed pulse is then sent to the speed comparator which, on the other hand, receives the target value from the mode selector section. The signal resulted from the comparison is sent to the pulse width modulator to obtain the PWM pulse of approx. 17.3 kHz in PAL mode and 14 kHz in NTSC mode, same as the one in the drum AFC loop. After polarity reversion, the PWM pulse is converted to DC voltage as it passes through the low pass filter and sent to pin ⑧ of IC701, where it is amplified to go out of pin ⑪. The DC amplifier gain is changed to the optimum value according to the tape speed in normal PLAY or Video Search mode, etc. (Gain is approx. 1 for PALY mode and approx. 15 for Video Search mode.) The error voltage amplified at pin ⑪ of IC701 is sent to pin ⑳ of DD motor driver IC (M51782) which is built in the capstan DD motor. The error voltage is converted to current and amplified inside of the IC to produce the rotational torque. Pin ⑲ of the DD motor driver IC receives the current limiter control voltage (Vc. LIMIT), which is approx. 0.8V in normal play and approx. 0.3 to 0.5V during unloading or reel idler oscillation. As the capstan motor control voltage at pin ⑪ is going to exceed Vc. limit, pin ⑩ becomes Low level and keeps the rotational torque within the fixed limit. Utilizing this characteristic, the rotational torque suitable for each mode can be obtained.

Figure 3-1 shows the relation between Vc. limit voltage and the rotational torque.

The rotation is reversed by making pin ⑳ of the DD motor driver IC to High level.

Table 11 shows the reference frequency/cycle of the drum frequency generator and capstan frequency generator.

6. Capstan APC Loop

The purpose of the capstan APC servo loop is to make the phase control for the video head on the basis of the playback control signal so that the video head will always trace the center of the video track during PLAY mode. As shown in Figure 3-2 (Timing chart), X-shift waveform signal which is synchronized with the drum phase reference signal of trapezoidal wave is sent to pin ⑩ of IC703 (AN6346N), where it experiences the tracking adjustment with the tracking monomulti-vibrator.

After this, the signal is sent to pin ⑥ of IC702 to create the capstan reference signal of trapezoidal wave which shows the rise at a fixed slope from its falling edge to its rising edge. The capstan reference signal thus produced is sent to the phase comparator.

The playback control signal is amplified at IC703 and then sent to pin ⑫ of IC702, where it is delayed by approx. 19 msec in NTSC mode and approx. 22 msec in PAL mode by use of the digital monomulti-vibrator. The signal is then sent to the phase comparator to make comparison with the abovementioned reference trapezoidal wave. The signal resulted from the comparison experiences the pulse width modulation to become the signal of approx. 3.5kHz in NTSC mode and 4.33kHz in PAL mode, which is sent out from pin ③ of IC702 and reversed at pin ④ of IC705. The signal is then converted into DC voltage by means of the low pass filter and added to the voltage present in the capstan AFC loop. In Video Search mode, the frequency divider whose operation corresponds to the NG speed ratio enables the stabilized search with the fixed noise bar. The speed ratio of the video search operation is evaluated as the total of the binary values given to pin ⑲ to ⑳ (VSC3-VSC0) of IC702. (Rotational speed is the same in FF/REW mode. See table 2.)

No.	Item	Mode	PAL		NTSC	
			Freq. (Hz)	Cycle (msec)	Freq. (Hz)	Cycle (msec)
1.	D.F.G. (pin ⑦ of IC704)	All	600	1.67	720	1.39
2.	C.F.G. (pin ⑲ of IC701)	2H	—	—	1080	0.93
		3H	760	1.32	—	—
		4H	—	—	540	1.85
		6H	380	380	540	1.85
3.	C.F.G. (pin ⑰ of IC701)	2H	—	—	540	1.85
		3H	380	2.63	—	—
		4H	—	—	270	3.70
		6H	380	2.63	540	1.85
4.	C.F.G. (VS or FF/REW) (pin ⑰ of IC701)	2H	—	—	3780	0.26
		3H	3420	0.29	—	—
		4H	—	—	4050	0.25
		6H	3420	0.29	8100	0.12

Table 1 Frequency of Drum/Capstan Frequency Generator

NO.	Mode	VSC (Pin)	0 (22)	1 (21)	2 (20)	3 (19)	Tinary Total
		Binary	1	2	4	8	
1.	SLOW/STILL (PAL/NTSC)		0	0	0	0	0
2.	NORMAL PB/REC		1	0	0	0	1
3.	VSF/VSR, FF/REW (PAL)		1	0	0	1	9
4.	VSF/VSR FF/REW (NTSC)		1	1	1	0	7

Table 2. VSC (0 ~ 3) for Each Mode

SERVO BLOCK DIAGRAM

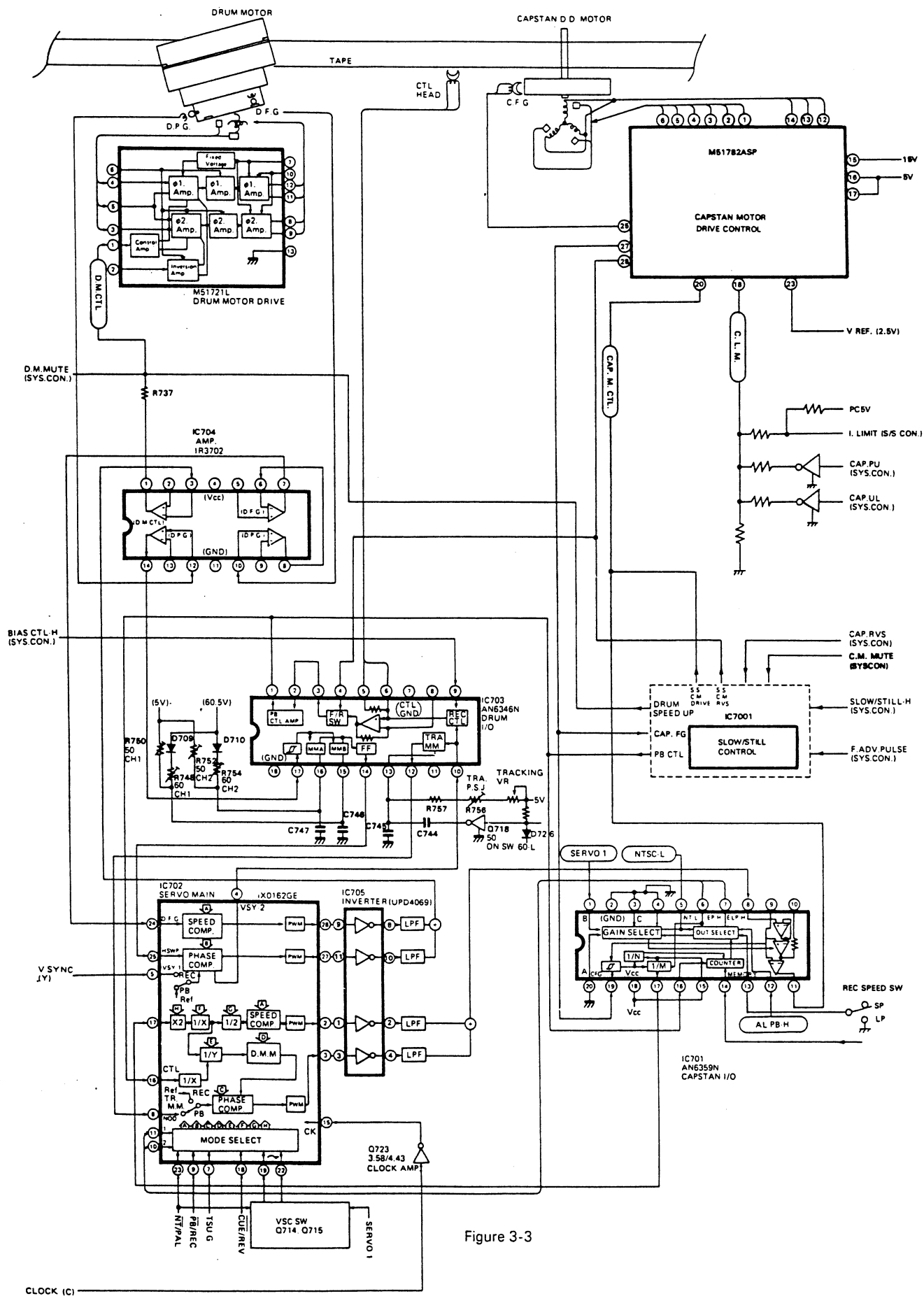


Figure 3-3

X value shift and tracking shift

With the double-azimuth 4-head system, the X value (distance between the video track and control signal) needs some corrections. The reasons for this are; the SP and EP heads on the same chip are in reversed

azimuth set-up; the tape patterns made by these heads have different centers; and the audio and control heads are mounted out of alignment to achieve stable fine slow feed.

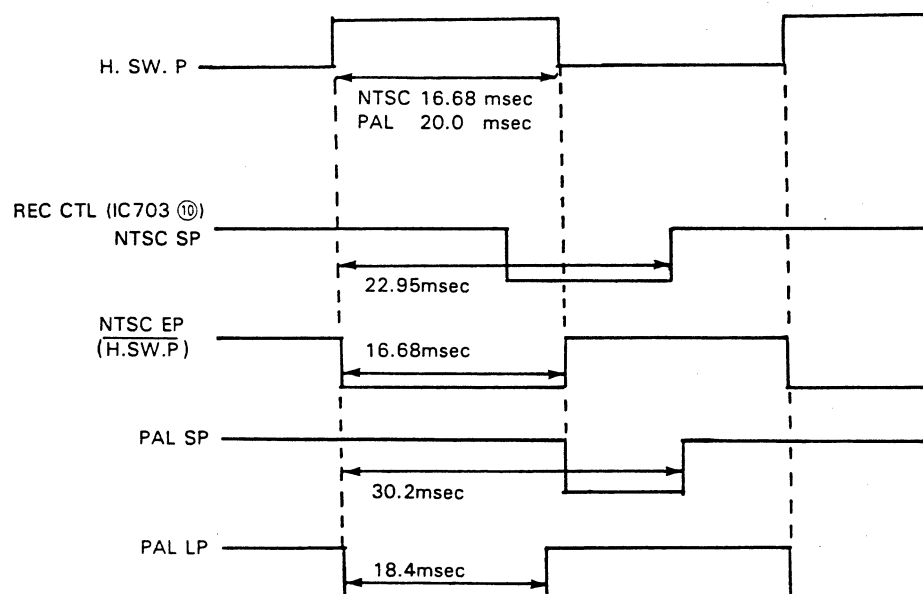


Figure 3-4 X-value shift

FINE SLOW CIRCUIT

The fine slow mode is controlled with the newly-developed IC7001 (RH-IX0200GEZZ). This circuit has several functions; control of the capstan motor for fine slow motion, head amplifier switching and chroma rotation to pick up the appropriate playback head in trick play mode, and false vertical sync signal generation.

1. Mode decoder (Table 3)

The normal-speed play, trick play and other modes are selected through the mode decoder. The decoding is carried out using the variable speed control signals VSC0 and VSC1 and the play/record speed memory (composed of ALPB(L) and memory (L)) -- namely, 3 input signals to be fed into the IC7001 --, as well as the EP(H) (logic(H)) which receives the speed mode signal from the IC702 (digital servo LSI).

Input terminal Mode	VSC0 (Servo 0)	VSC1 (Servo 1)	Record/ play memory
	Pin (24)	Pin (23)	Pin (25)
Slow/Still	L	L	L
Normal-speed play	H	L	M
Search	H	H	(Note 1) M or L
Record	H	L	H
Transient	H	L	L

Table 3. MODES AND CONTROL LEVELS

The transient mode provides for a transient time from the instant the trick play (search, slow/still) is cleared to the instant the memory (L) (record/play memory is at "L") turns "H".

- Period from trick play mode clear to stable tape traveling
 - 1) The false vertical sync signal is added.
 - 2) The envelope detection mode is introduced in the SP mode to reproduce less-noise picture.
- The above two actions 1) and 2) are achieved by the mechanical position shift when the reverse search mode is chosen or cleared.

NOTE: "L" is applied only when the mechanical position is shifted to choose the reverse search mode.

2. Head amplifier switching and chroma rotation (Table 4)

The double-azimuth 4-head configuration (the heads have two different azimuths on the same PWB) enables to select the best play head for noise-less playback in the trick play mode. To achieve this, the head amplifier switching signal and the accompanying chroma rotary signal are generated.

3. False vertical sync signal generation (refer to chapter 5.)

In the trick play mode, the head trace comes across the tape pattern, which causes an envelope switching point. This means the playback vertical sync is

affected to invite a vertical sync skip on the TV monitor. Also vertical jitter is brought on the TV monitor because of fluctuations of the field cycle. To avoid them, the false vertical sync is added to the video playback signal.

This false vertical sync signal is generated in the following two patterns.

- Vertical sync skip prevention in search and transient modes:
The phase inserted in the false vertical sync is fixed (mode A)
- Vertical jitter prevention in slow/still modes:
User control modes (mode B, mode C) are available to adjust the phase being inserted in one side of the false vertical sync to the TV monitor in use.

In the modes B and C, the analog mono-multi vibrator in relation to the head switching signal is in reverse phase about the SP and EP modes just to allow user control. Thus the user control switch is used in common with the SP and EP modes. In the slow play mode, on the other hand, the vertical vibrations found during the tape feed are corrected with the ROM value of digital mono-multi vibrator.

4. Fine slow control

The fine slow control is conducted by repeating the one-frame tape feed and play and the multi-frame still play. The slow speeds (1/5 to 1/30 of the normal speed) are controlled by changing the number of frames in the still play. Which speed to pick up is determined by the repeated cycle of FA (frame advance) pulse from the system controller.

The tape feed system makes for noise-less slow. When the FA pulse enters, the capstan motor is forced to accelerate its speed in an appropriate timing from the leading edge of head switching pulse. The control signal coming from the control head is then applied in an appropriate timing (slow tracking) to activate the capstan motor's reverse brake to decelerate and stop the capstan motor. This series of actions is made within a two-frame period just to attain noise-less slow play. These steps are charted below.

1. The FA pulse is fed from the system controller.

2. An appropriate timing (start DMM) is taken from the head switching pulse's trailing edge.

3. A forced acceleration command is given to the capstan motor.

(Capstan control set to Forced "H".
Current limit set to start torque current.)

When the speed has reached a certain level in capstan's frequency generator cycle:

(continued)

4. The forced acceleration is shut off. An appropriate intermediate speed is achieved by the IC702.

(IC7001 is in high-impedance state.)

5. A control signal is fed from the control head.

6. The right slow tracking is taken by the slow tracking mono-multi vibrator.

7. Forced deceleration.

(Capstan control set to Forced "H".
Capstan reverse set to "H".
Current limit set to start torque current.)
When the speed has come down to a certain level in capstan's frequency generator cycle:

8. The current limit is set to "L". The capstan motor slows down and stops.

9. The tape feed is completed (still play hereafter).

10. A very weak normal-direction torque is generated in the capstan motor.

The IC7001's current limit is at high-impedance level. Reaction vibrations due to tense reel belt, and slack of the tape are avoided. (5 leading edges of head switching pulse are counted for the re-acceleration period.)

11. The forced acceleration/stop outputs are set to "L" to stop the capstan motor (now on standby).

The intermediate speed controlled by the IC701 is provided for stable slow playback; this is preset to 85% of the normal speed. The forced acceleration and deceleration are under control through detection of the capstan's frequency generator cycle. Accordingly, stable slow playback is ensured even as the load fluctuates from time to time.

Thanks to the slow braking, reaction vibrations caused by the reel belt, which becomes tense just after the tape has been fed in the slow play mode, can be prevented.

	Input			Output		
	SP/LP (Note 2)	HSW	Envelope detection	Head amplifier	Chroma rotation	
Normal-speed play REC	SP	HSW	—	H	Head switching reverse	
	$\overline{\text{SP}}$	HSW	—	L	HSW	
Search and transient	SP	H	L	H	L	Envelope detection mode
			H	L	H	
		L	L	H	H	
			H	L	L	
	$\overline{\text{SP}}$	HSW	—	L	HSW	
Slow/still (Note 1)	SP	HSW	—	HSW	L	EP-L and SP-R used
	EP	HSW	—	Head switching reverse	H	EP-R and SP-R used

Table 4. HEAD AMP. SWITCHING AND CHROMA ROTATION

Ref.) The envelope detection mode provides for feeding an envelope detection input in the SP mode and switching the head to be used. A head with larger output is selected to make the on-screen picture less noisy. (SP-speed search, and transient modes.)

NOTE 1.

The head amplifier switching and chroma rotation while in the slow mode are referred to in Figs. 3-10 and 3-11, Fine Slow Timing Charts (1) and (2). For these functions at a shift to the slow/still mode, see Fig. 3-12, Timing Chart at Mode Shift.

12, Timing Chart at Mode Shift.

NOTE2. SP mode : PAL SP

NTSC SP

$\overline{\text{SP}}$ mode : PAL LP

NTSC LP, EP

Head output	Envelope detection Pin ②①	Head amplifier switching Pin ②⑥	Chroma rotation Pin ②⑦
SP < EP	H	L (EP head)	Head switching
SP > EP	L	H (SP head)	Head switching reverse

5. False vertical sync pulse generation (refer to chapter 3.)

5-1. Pulse output conditions

- (1) Search mode
- (2) Slow/still mode
- (3) Transient mode

The transient mode gives a transient time from the instant the above three modes (1)-(3) are cleared to the instant the memory (L) (record/playback memory) is activated.

5-2. Pulse waveform patterns

Mode		Waveform pattern
Search and transient	SP	Pattern A
	EP	Pattern A
Slow/still	SP	Pattern B
	EP	Pattern C

For the period "M" (T4 time in the drawing), the false vertical sync pulse works as the false vertical sync signal.

5-3. False V-sync pulse timing chart

MODE A (SERVO and/or TRANSIENT MODE)

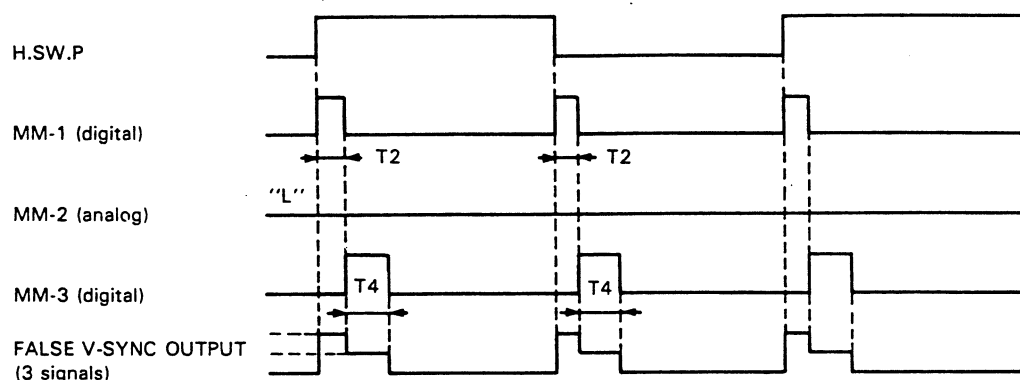


Figure 3-5

MODE B (SLOW/STILL MODE (SP MODE))

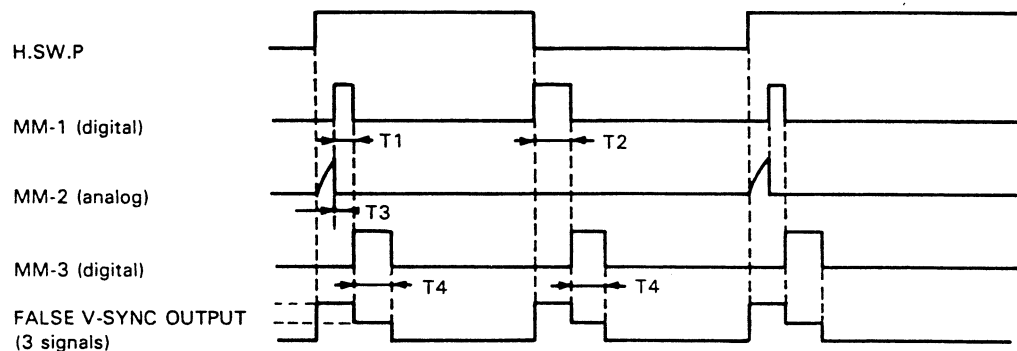


Figure 3-6

MODE C (SLOW/STILL MODE (EP MODE))

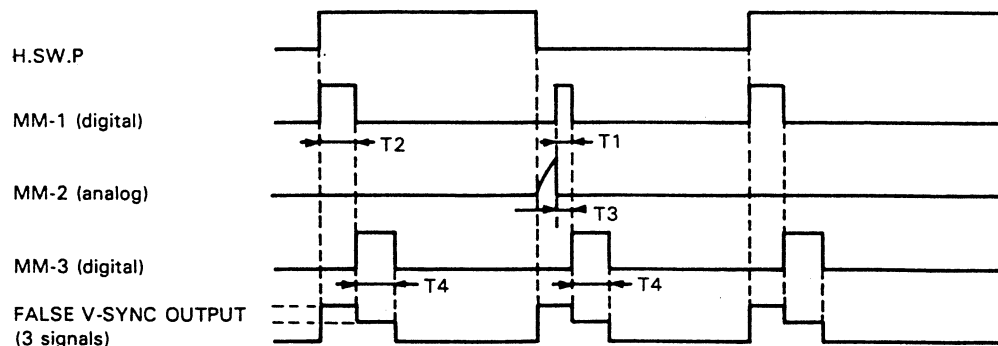


Figure 3-7

5-4. False V-sync fluctuation (in Slow/Still mode)

During the slow mode, just when the forced acceleration is over, there comes a vertical fluctuations period up to the leading edge of the false vertical sync output "M" which is formed by the leading edge of the head switching pulse. For this correction period, the digital mono-multi vibration value is changed.

SP MODE

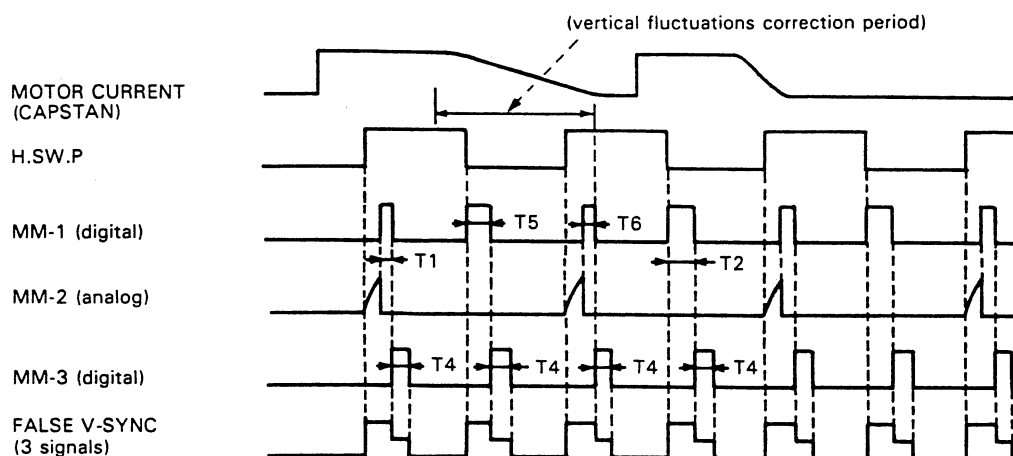


Figure 3-8

EP(LP) MODE

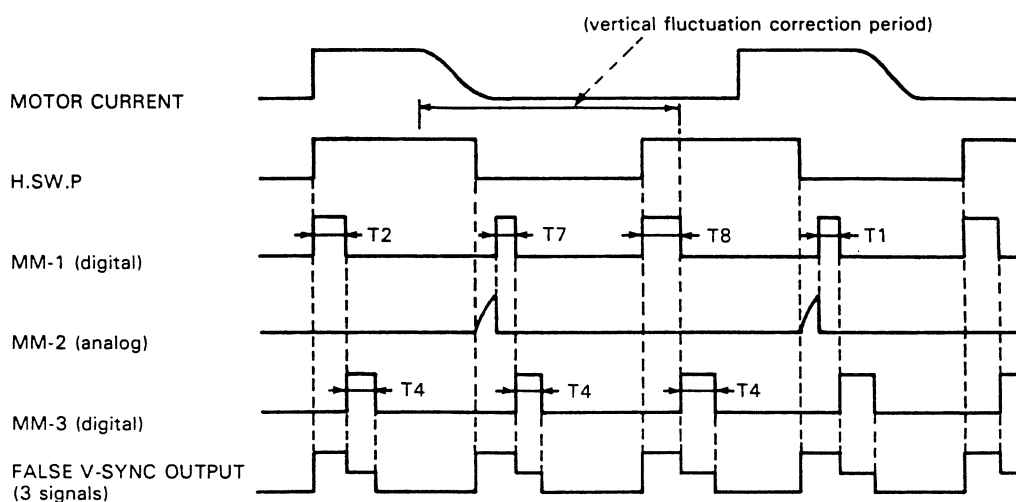


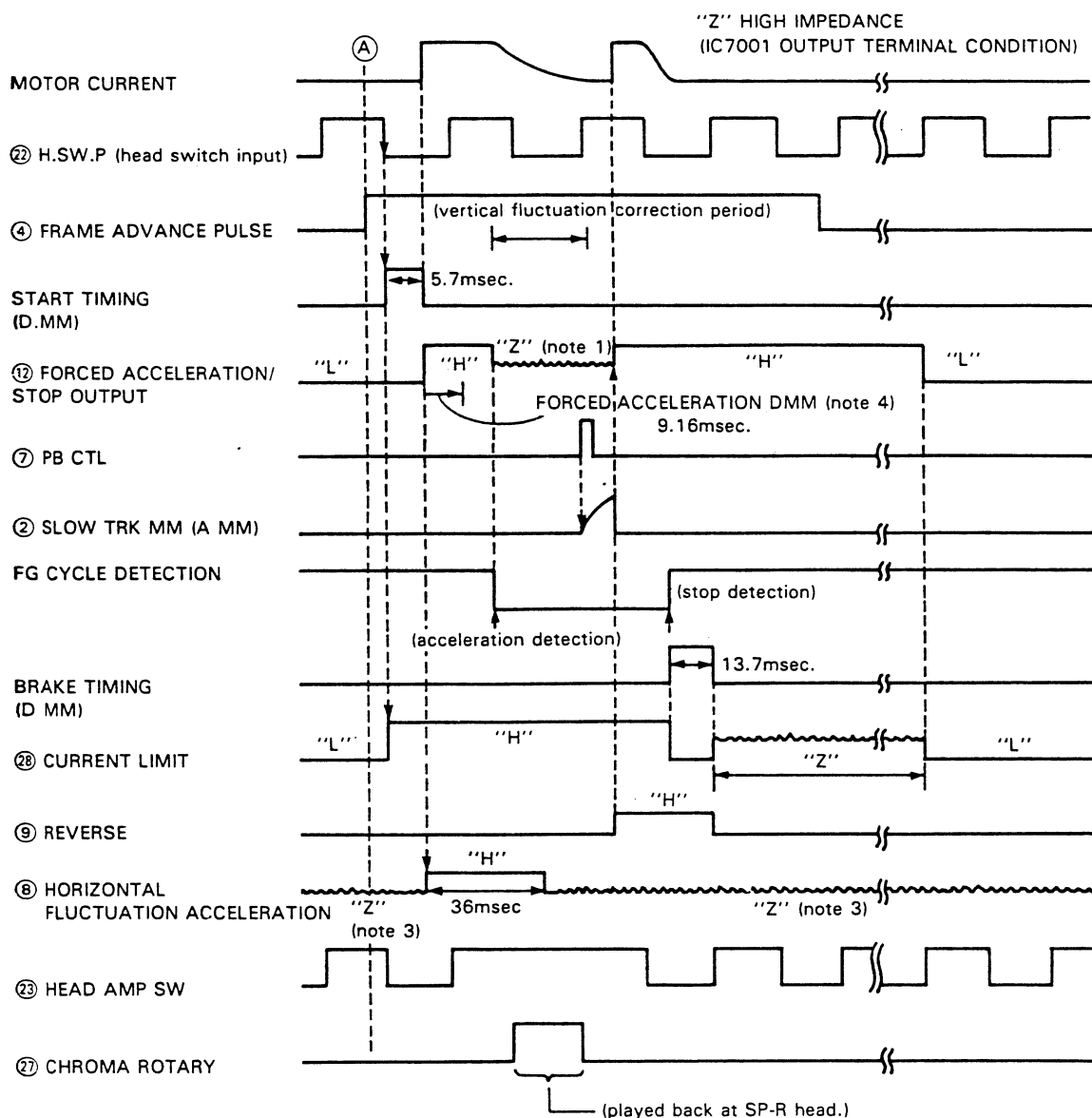
Figure 3-9

5-5. Digital mono-multi vibrator setting

			Symbol	Digital mono-multi vibration width
Without vertical fluctuation correction period	Analog mono-multi vibration available		T ₁	Approx. 230 μsec. (about 3.6H)
	Analog mono-multi vibration not available		T ₂	Approx. 300 μsec (about 4.7H)
Within vertical fluctuation correction period	SP mode	Head switching pulse's trailing edge	T ₅	Approx. 370 μsec (about 5.8H)
		Head switching pulse's leading edge	T ₆	Approx. 190 μsec (about 3.0H)
	LP/EP MODE	Head switching pulse's trailing edge	T ₇	Approx. 155 μsec (about 2.4H)
		Head switching pulse's leading edge	T ₈	Approx. 300 μsec (about 4.7H)
Within false vertical sync output "M" period (pulse width)			T ₄	Approx. 285 μsec (about 4.5H)

TABLE 5

SP MODE



NOTE:

1. For this period the speed is controlled to about 85% of the normal speed by the IC702.
2. 5 leading edges of the head switching pulse are counted. If the frame advance pulse becomes H—L—H for this period, this sequence starts at (A). During this period, there is a very small motor current available, which is equivalent to the voltage divided by R824, R825 and R828. Consequently, the capstan motor gives a very weak torque in the normal rotating direction.
3. During this period, the drum speed is being controlled by the IC702.
4. During this period, "H" output is given irrespective of the frequency generator cycle acceleration detection.

Figure 3-10 FINE SLOW TIMING CHART (1)

EP(LP) MODE

MOTOR CURRENT

⑫ H.S.W.P
(head switch input)

④ FRAME ADVANCE PULSE

START TIMING (D MM)

⑫ FORCED ACCELERATION
/STOP OUTPUT

⑦ PB CTL

② SLOW TRK MM (A MM)

FG CYCLE DETECTION

BRAKE TIMING
(D MM)

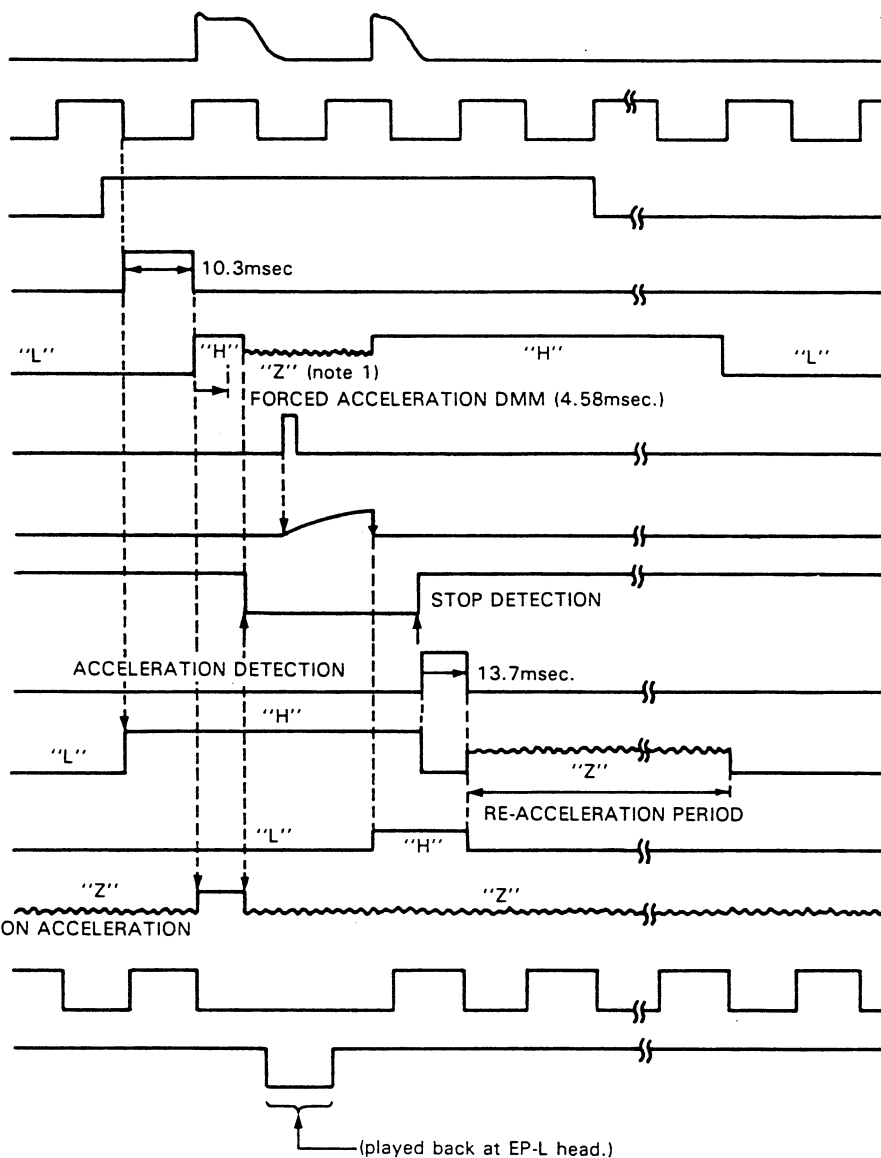
⑫ CURRENT LIMIT

⑨ REVERSE

⑧ HORIZONTAL FLUCTUATION ACCELERATION

⑫ HEAD AMP SW

⑫ CHROMA ROTARY



NOTE:

1. During this period, the speed is being controlled to be about 85% of the normal speed by the IC702.

Figure 3-11 FINE SLOW TIMING CHART (2)

SHIFT TO SLOW/STILL MODE

⑫ VSC 0

⑫ VSC 1

④ FRAME ADVANCE PULSE

⑫ H.S.W.P

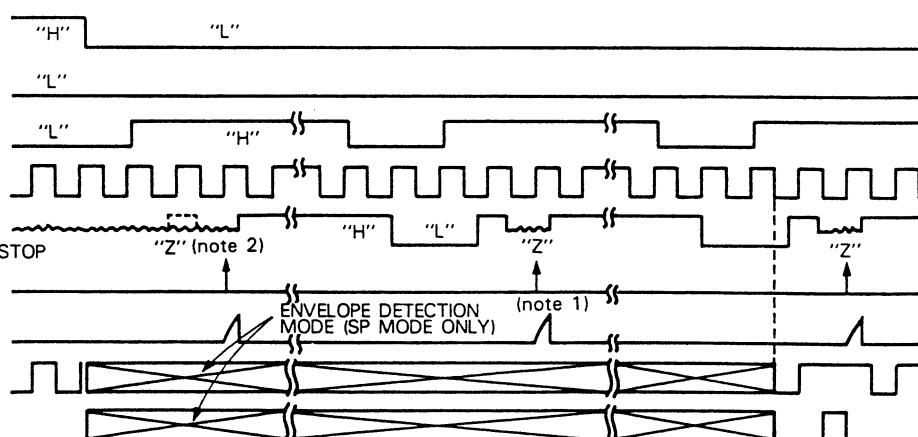
⑫ FORCED ACCELERATION/STOP

⑦ CTL

② SLOW TRK MM

⑫ HEAD AMP SW

⑫ CHROMA ROTARY



NOTE:

1. The head amplifier switching and chroma rotation remain in the envelope detection mode until the first trailing edge of the head switching pulse at the 3rd FA (frame advance) "H" after the slow/still mode has been brought in.
2. Once the slow/still mode is brought in, the first "H" level of the forced acceleration/stop output (The "H" level for accelerating the capstan motor.) is not given.

Figure 3-12 MODE SHIFT TIMING CHART AT
(shift to slow/still mode)

FINE SLOW CIRCUIT BLOCK DIAGRAM

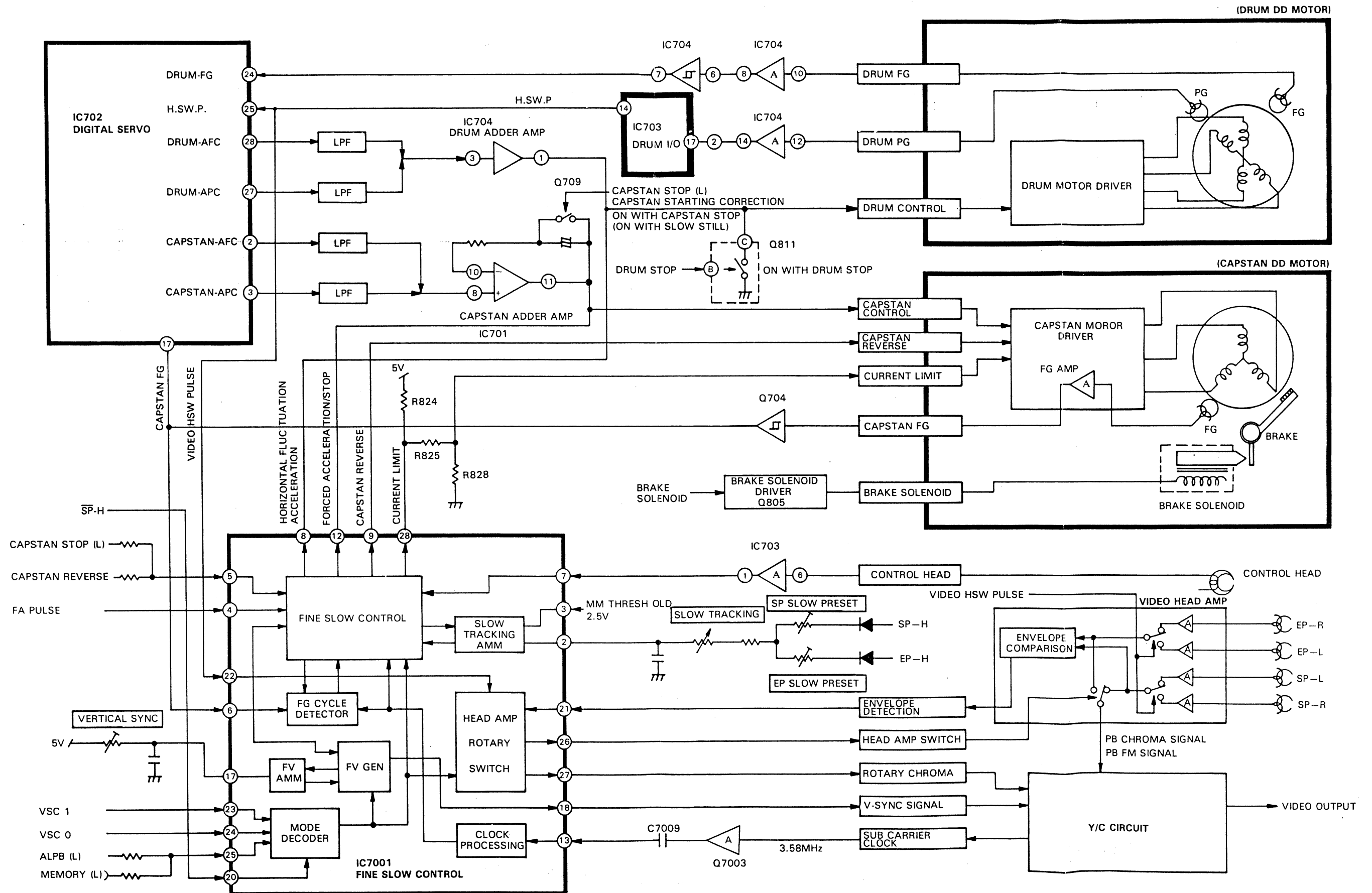
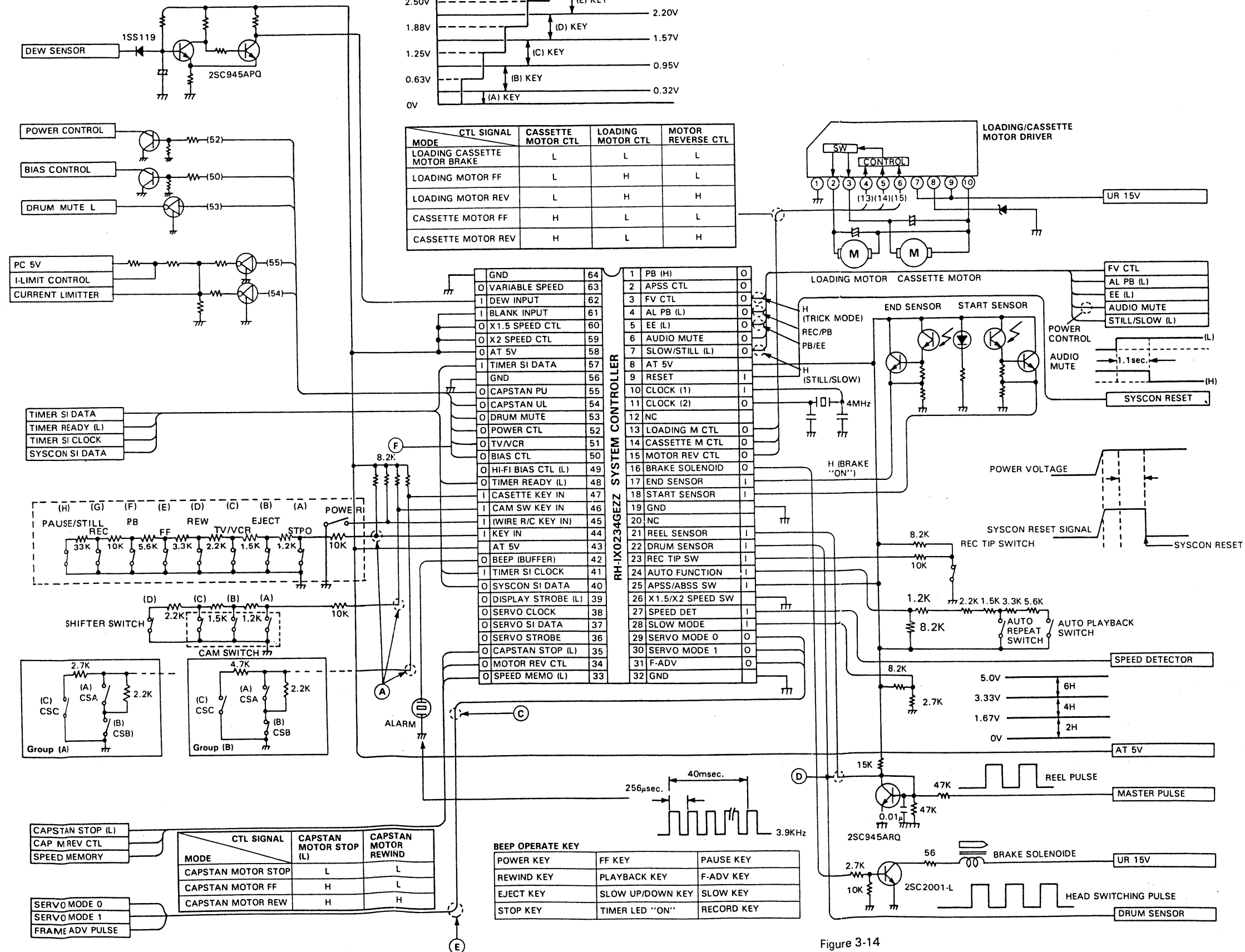


Figure 3-13

SYSTEM CONTROLLER DESCRIPTIONS



(C)

CTL SIGNAL	SERVO MODE "0"	SERVO MODE "1"
MODE		
REC	H	L
EDIET	H	L
STOP	H	L
PB	H	L
STILL	L	L
SLOW	L	L
VSF/VSR	H	H
FF/REW	H	H
UNLOADING	H	H
LOADING	L	H

(D)

MODE	SHAT OFF TIME
SP/LP-PB SP/LP-REC FF REW	5.0 sec
EP-PB EP-REC	10.0 sec
VSR VSF	1.2 sec

(E)

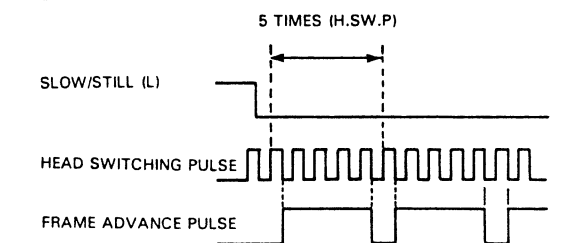


Figure 3-14

IF CIRCUIT

1. PAL-B/G, I, D/K, M System Broadcast

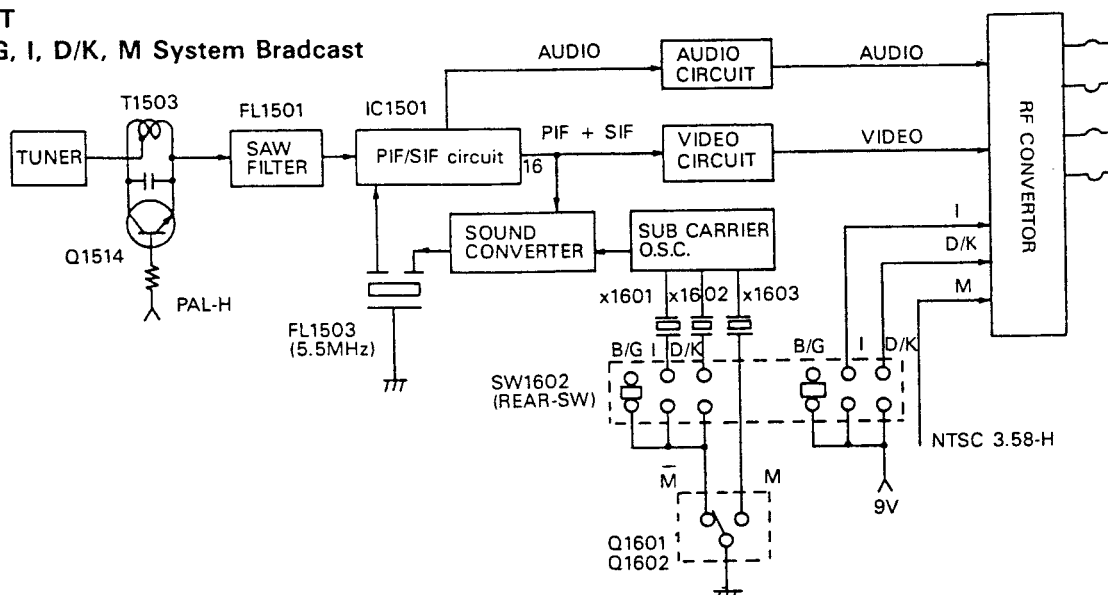


Figure 3-15 Block diagram of IF circuit

2. NTSC 3.58-MHz Subcarrier (M System) Reception

T1503, an SIF trap (34.4 MHz) of the NTSC 3.58-MHz subcarrier signal, is turned on and off by Q1514.

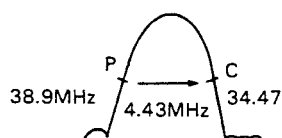


Figure 3-16

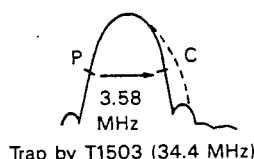


Figure 3-17

In the PAL system, Q1514 remains on with the characteristic shown in Fig. 16. When receiving the NTSC 3.58-MHz subcarrier signal, Q1514 is kept off to activate the 34.4-MHz SIF trap (T1503 in M system), thereby getting rid of video beat which may be caused by the sound carrier.

3. Sound Multiplex Broadcast

Sound carriers of different frequencies depending on the systems — 5.5 MHz in B/G, 6.0 MHz in I, 6.5 MHz in D/K, and 4.5 MHz in M — are all subject to the sound converter to eliminate any beat due to the subcarrier. These sound carriers are converted into the B/G system sound carrier and then detected. SW1602 is used to select the frequency of the subcarrier oscillator and turn on and off the RF converter output.

Receiving system	Sub carrier	Differential output (MHz)
B/G (5.5M)	—	5.5
I (6.0M)	X1601 (11.5 MHz)	5.5
D/K (6.5M)	X1602 (12.0 MHz)	5.5
M (4.5M)	X1603 (10 MHz)	5.5

Table 6. Receiving systems and subcarrier signals in converting into B/G system sound carrier

4. NTSC Skew Error Compensation

With the adopted double-azimuth 4-head system, the video head is switched (AA' and BB' head) in the trick mode (video search, still) to pick up the greater output and give it out. The video head is, however, structurally spaced to match 2H of the video signal in the PAL mode.

Which means the 2H component in the PAL mode is not equivalent to the 2H component in the NTSC mode. Thus the video signal lags when the video head is switched from the PAL to the NTSC mode or vice versa, causing images distorted or out of colour. To cope with these troubles, the CCD (delay element) is introduced to electrically compensate for the mechanical time lag of the video signal. (See next page.)

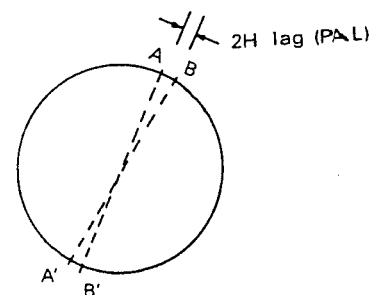


Figure 3-18 Video head

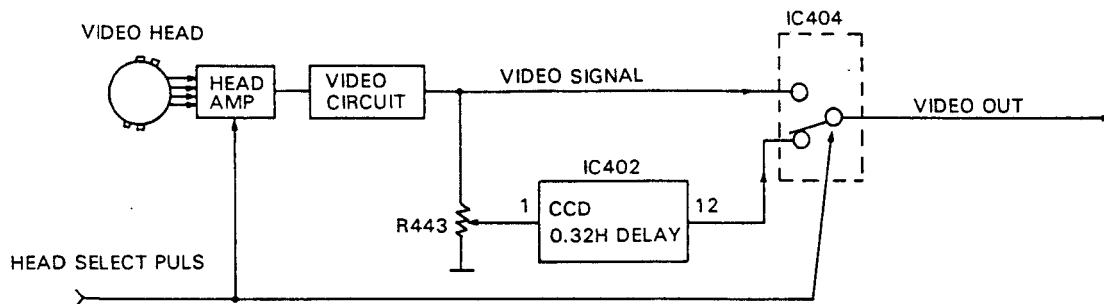


Figure 3-19 Block diagram of NTSC trick mode

IC402 is used to delay by about 0.32H the video signal that goes ahead. The delayed signal is synchronized with the through signal and switched by IC404.

If the through signal and the delayed signal happen to be different in amplitude, some luminance brightness distortion, flickering and other phenomena appear on the screen. The level adjuster R443 is provided for correcting these troubles.

SYSTEM IDENTIFICATION CIRCUIT CIRCUITRY BEHAVIORS

1. 50 Hz/60 Hz Discriminator Circuit

The 50 Hz/60 Hz discriminator circuit works to detect the frequency of the sync signal. It discriminates PAL, MESECAM and SECAM systems, each of which includes 50 Hz vertical sync signal and 15.625 kHz horizontal sync signal, from NTSC4.43 and NTSC3.58 systems, each of which includes 60 Hz vertical sync signal and 15.734 kHz horizontal sync signal. The discrimination is done by utilizing the sync signal separated from the video signal.

[Operation in Recording Mode]

The composite sync signal going out of pin ② of IC201 is applied to the integrating circuit made of R205 and C202, where the vertical sync signal alone is picked up and applied to the base of Q3006. The signal is then shaped in Q3006 and Q3007, and integrated in R3016 and C3008. The resultant signal is sent to pin ⑤ of IC3001. Pin ⑤ of IC3003 is + input of the comparator, while pin ④ is - input. When the voltage available at pin ⑤ is higher than the voltage at pin ④, the output of pin ② becomes High level. On the other hand, when the former is lower than the latter, the output of pin ② becomes Low level.

As shown in Figure 3-20, the sawtooth wave coming into pin ⑤ is compared with the voltage at in ④ and then there is caused an output pulse at pin ②. In the case of receiving 50 Hz sync signal, the output pulse available at pin ② has the longer duration of its High level, while it has the shorter duration of its High level in the case of receiving 60 Hz sync signal.

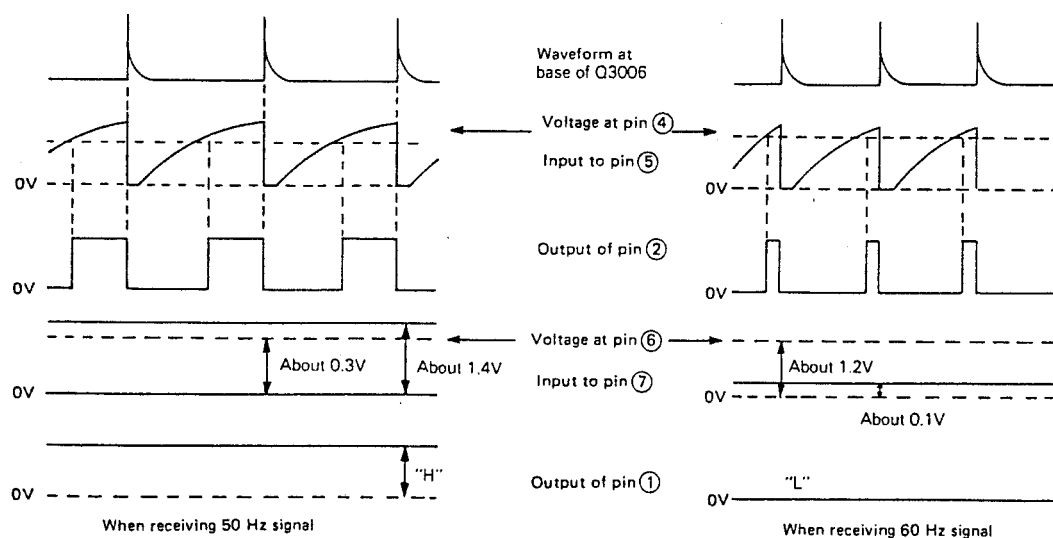


Figure 3-20 Waveform at Each Pin of 50 Hz/60 Hz Discriminator circuit IC3001

The pulse going out of pin ② of IC3001 is integrated in R3010 and C3004 to become DC voltage which is sent to pin ⑦. Pin ⑦ is + input of the comparator and pin ⑥ is - input: the output signal is caused at pin ①. As shown in Figure 3-21, when the 50 Hz sync signal is received, the voltage at pin ⑦ becomes higher than the voltage at pin ⑥ to send out High-level signal from pin ①. When the 60 Hz sync signal is received, on the other hand, the voltage at pin ⑦ becomes lower than the voltage at pin ⑥ to send out Low-level signal from pin ①. By the output from pin ①, the Q3002 and Q3003 are switched on and off.

[Operation in Playback Mode]

How the 50 Hz/60 Hz discriminator circuit operates in playback mode is basically the same as in recording mode, except that its operation is implemented with the horizontal sync signal instead of the vertical sync signal. The operation is performed by utilizing pins ⑧ to ⑭ of IC3001.

What is different when compared with the operation in the recording mode is simply that the input signal used is the horizontal sync signal whose frequency is at either 15.625 kHz or 15.734 kHz. Since there is only a little difference between the two horizontal sync signal (15.625 kHz and 15.734 kHz), the resultant voltage at pin ⑧ is almost the same.

However, when the tape recorded at 15.625 kHz (50 Hz) frequency is put to playback at 60 Hz speed, the frequency of the resultant horizontal sync signal becomes approx. 18 kHz. when the tape recorded at 15.734 kHz (60 Hz) is put to playback at 50 Hz speed, the resultant frequency becomes approx. 13 kHz. Utilizing this difference frequency, the discriminator circuit is provided with the hysteresis characteristics as shown in Figure 3-22 to perform the discrimination operation. The hysteresis is controlled by the resistor R3005. The final output for discrimination is caused at pin ⑭, which becomes High level during the playback of 50 Hz sync signal and becomes Low level during the playback of 60 Hz sync signal in the same way as in the recording mode.

By the output from pin ⑭, the Q3001 is switched on and off.

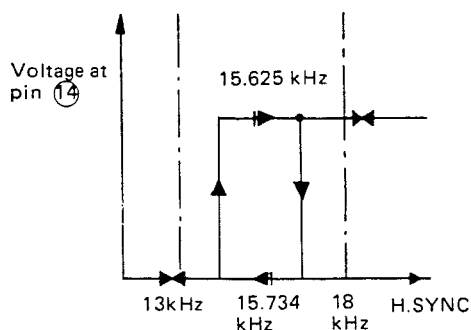


Figure 3-21

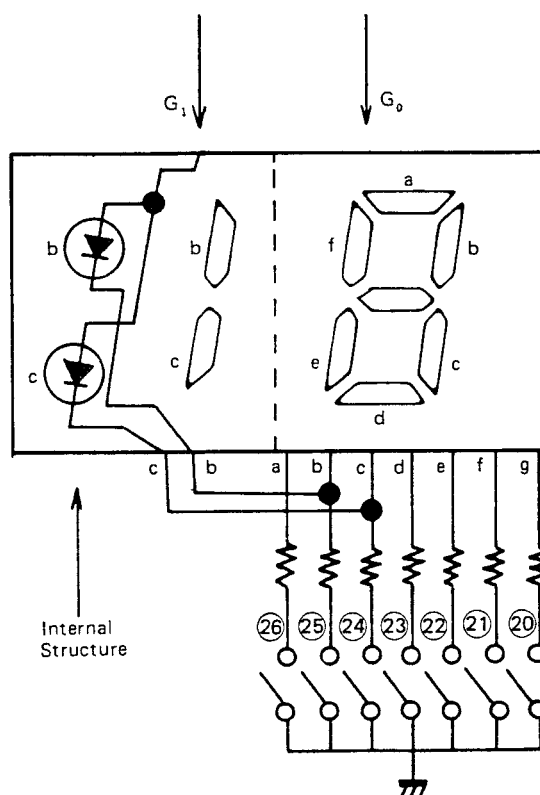


Figure 3-22

SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:

BE SURE TO USE GENUINE PARTS FOR SECURING THE SAFETY AND RELIABILITY OF THE SET. PARTS MARKED WITH "Δ" AND PARTS SHADED (IN BLACK) ARE ESPECIALLY IMPORTANT FOR MAINTAINING THE SAFETY AND PROTECTING ABILITY OF THE SET.

BE SURE TO REPLACE THEM WITH PARTS OF SPECIFIED PART NUMBER.

SAFETY NOTES:

1. DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.
2. SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.

NOTES:

1. The unit of resistance "ohm" is omitted ($k = 1000 \text{ ohm}$, $M = 1 \text{ Meg ohm}$).
2. All resistors are 1/8 watt, unless otherwise noted.
3. The unit of capacitance "F" is omitted ($\mu = \mu F$, $p = \mu\mu F$).

VOLTAGE MEASUREMENT CONDITIONS:

1. DC voltages are measured between points indicated and chassis ground by VTVM, with AC110-240V, AUTO 50/60Hz supplied to unit and all controls are set to normal viewing picture unless otherwise noted.
2. Voltages are measured with $10000\mu V$ B & W or colour signal.

WAVEFORM MEASUREMENT CONDITIONS:

$10000\mu V$ 87.5 percent modulated colour bar signal is fed into tuner:

CAUTION:

This circuit diagram is original one. Therefore there may be a slight difference from yours.

The diagram is a complex schematic showing the interconnections of various printed wiring boards (PWBs) and components in a VCR. Key sections include:

- PWB-Z (Drum Motor):** Controls the drum motor and heater.
- PWB-X (Head Amp):** Amplifies signals for the video heads.
- PWB-E (Duntk2536HE50):** A central control board with multiple input/output lines.
- PWB-T/2 (Timer):** Manages the timing of the VCR's operations.
- PWB-W (Relay Connection):** Controls the relay for tape transport.
- PWB-C (Y/C/PAL IF Tuner):** Handles the video and audio input signals.
- PWB-A (System Control Servo Still FV):** Controls the servo motor and still/frame advance functions.
- PWB-N (Slave Sensor):** Provides feedback for the system control.
- PWB-B (Audio Chroma):** Processes the audio and chrominance signals.
- PWB-H (Operation):** Manages the overall operation of the VCR.
- PWB-R (TSG Sub Audio):** Controls the sub-audio tone control.
- Power Unit:** Provides the necessary power for the system.

The diagram includes numerous test points (TP) and component values (e.g., resistors, capacitors, inductors) for troubleshooting and assembly.

Figure 4-1.

PWB-A, SERVO CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Fig. 4-15.

Capstan automatic frequency
control signal

Drum automatic frequency
control signal

Capstan automatic phase
control signal

Drum automatic phase
control signal

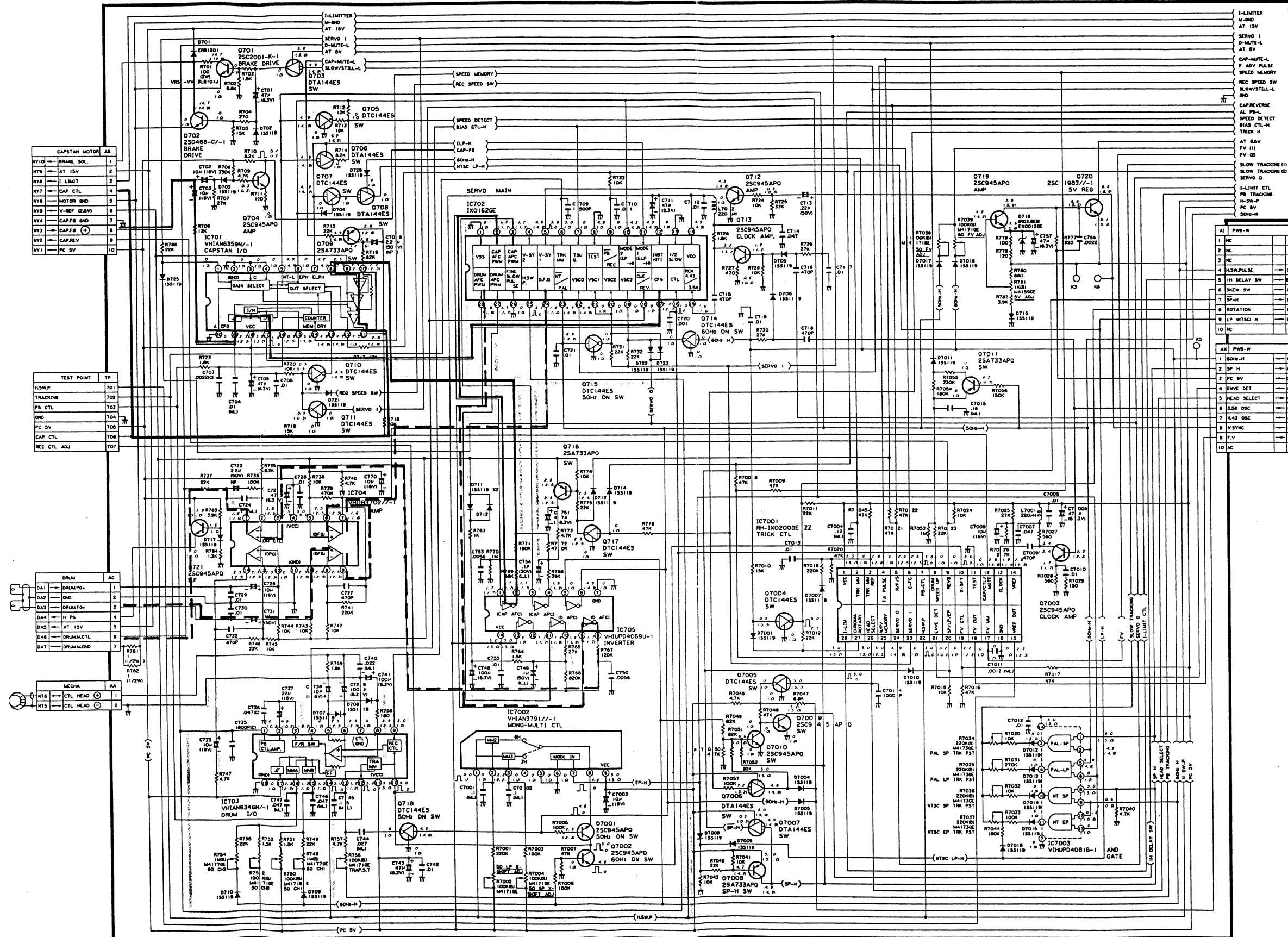


Figure 4-2.

PWB-A, SYSTEM CONTROL CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Fig. 4-15.

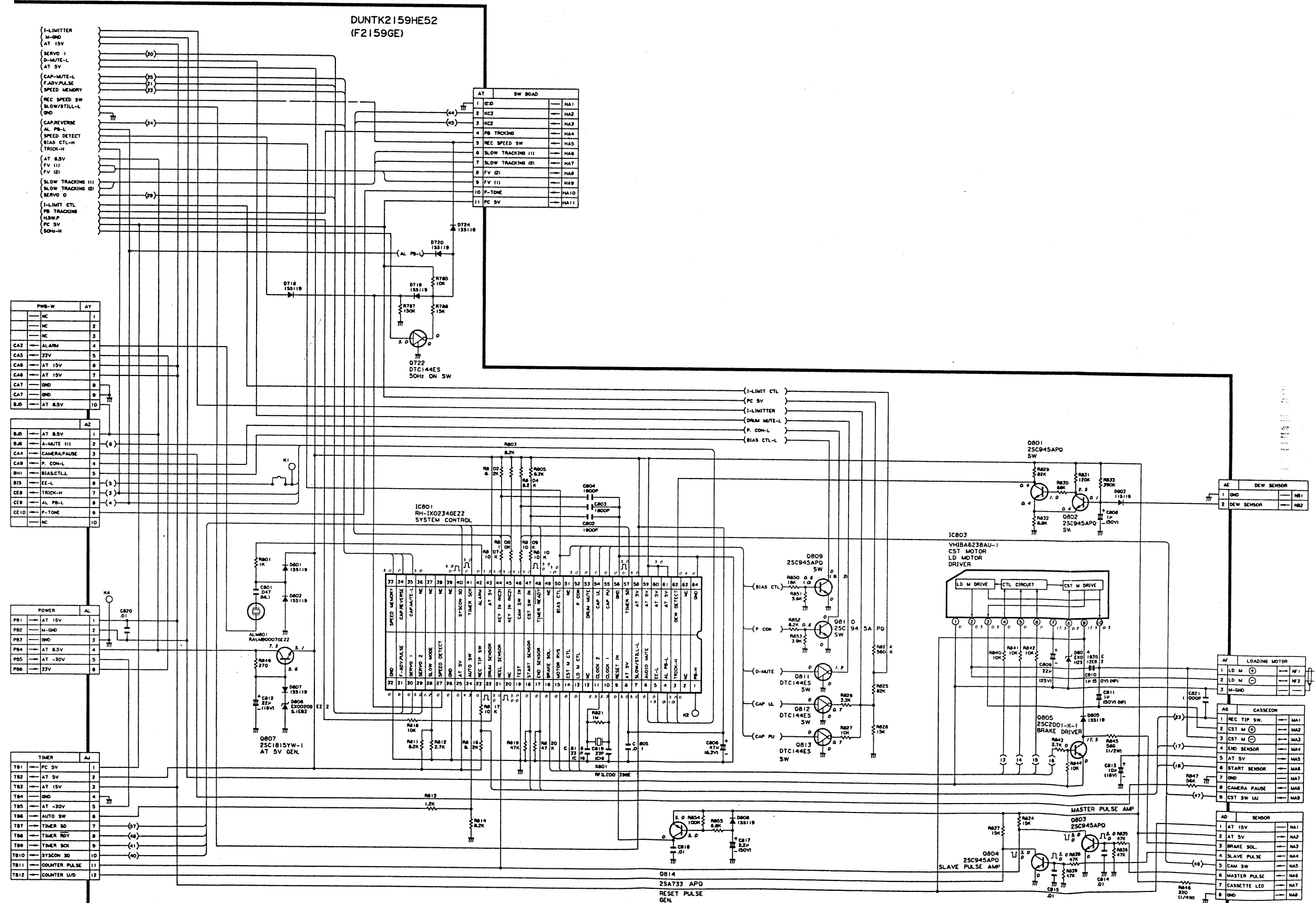


Figure 4-3.

PWB-B, AUDIO/CHROMA CIRCUIT SCHEMATIC DIAGRAM (NTSC, SECAM)

NOTE: For Wiring Side PWB, refer to Fig. 4-16.

Playback chrominance signal (SECAM)
 Playback chrominance signal (NTSC 3.58)
 Audio record signal
 Audio E-E signal

Record chrominance signal (NTSC 3.58)
 Record chrominance signal (SECAM)
 Audio playback signal

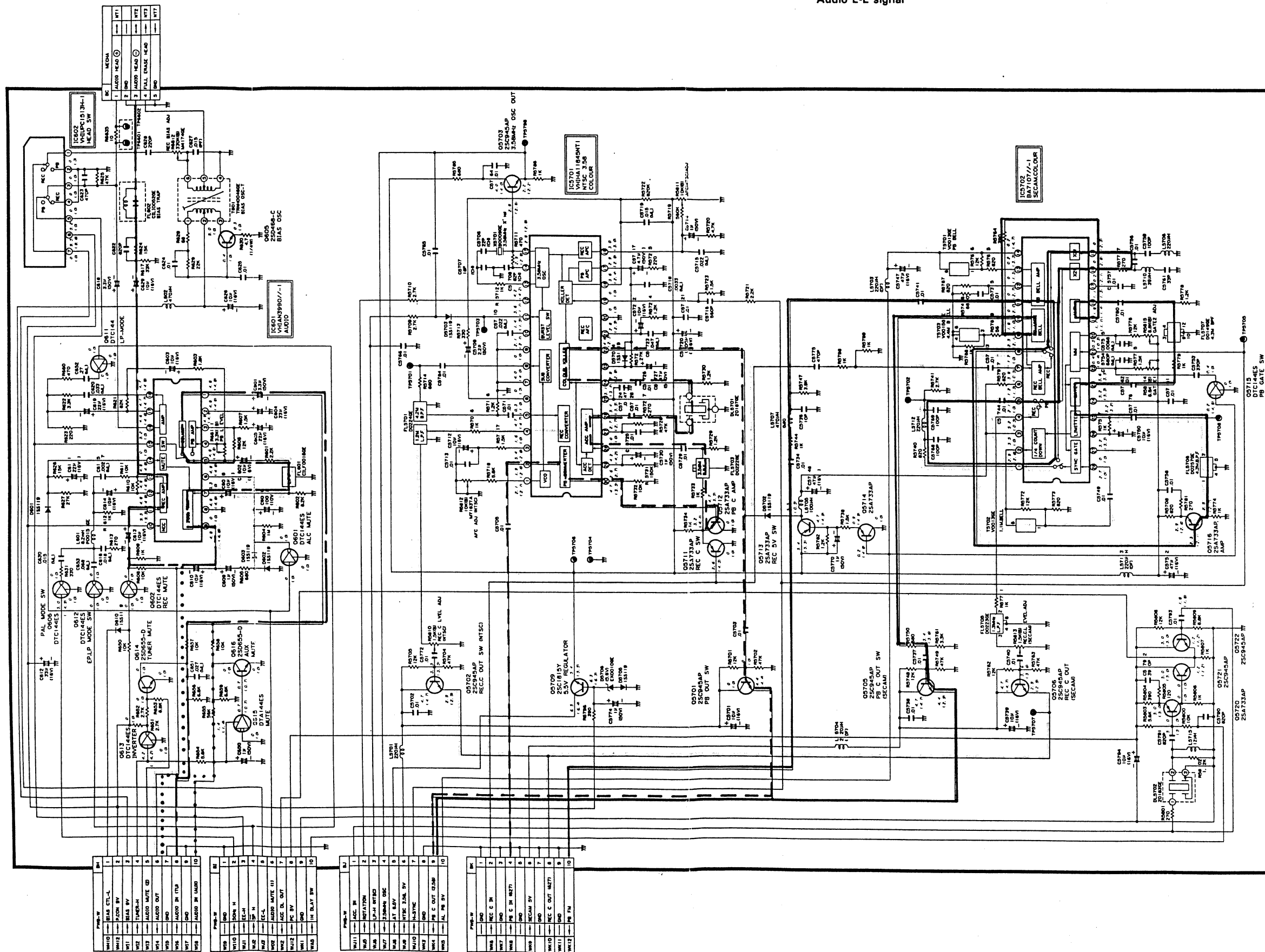


Figure 4-4.

NOTE: For Wiring Side PWB, refer to Fig. 4-17.

— Record luminance signal

Playback chrominance signal
(NTSC 3.58, SECAM)



Figure 4-5.

PWB-R, TEST SIGNAL SOUND CONVERTER CIRCUIT SCHEMATIC DIAGRAM/ PWB-C, IF CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Figs. 4-17 and Fig. 4-21.

Video signal
(PAL, SECAM, NTSC 4.43)
Video output signal

Video signal (NTSC 3.58)
Audio signal

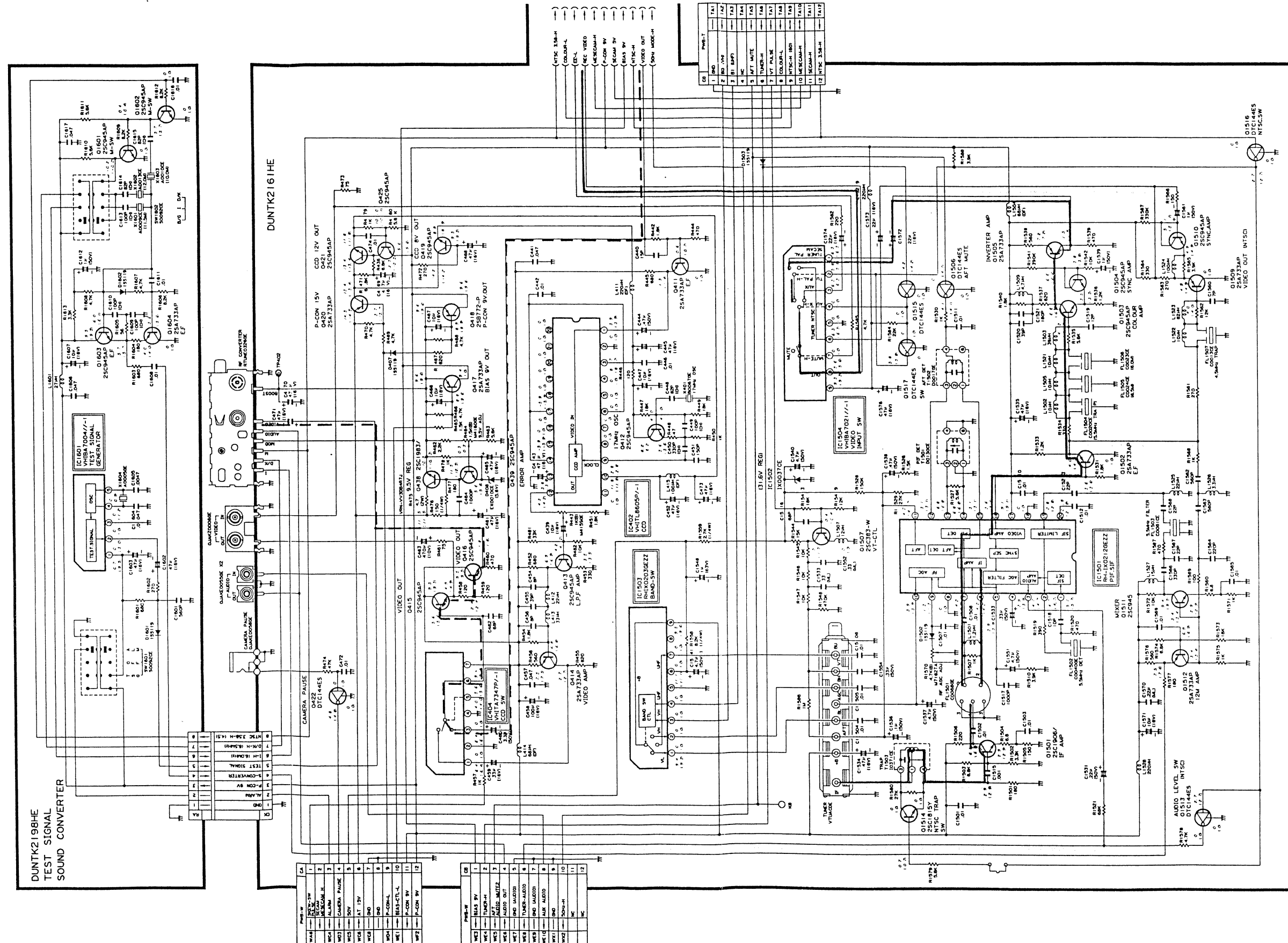
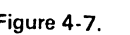


Figure 4-6.

NOTE: For Wiring Side PWB, refer to Fig. 4-18.



NOTE: For Wiring Side PWB, refer to Fig. 4-19.

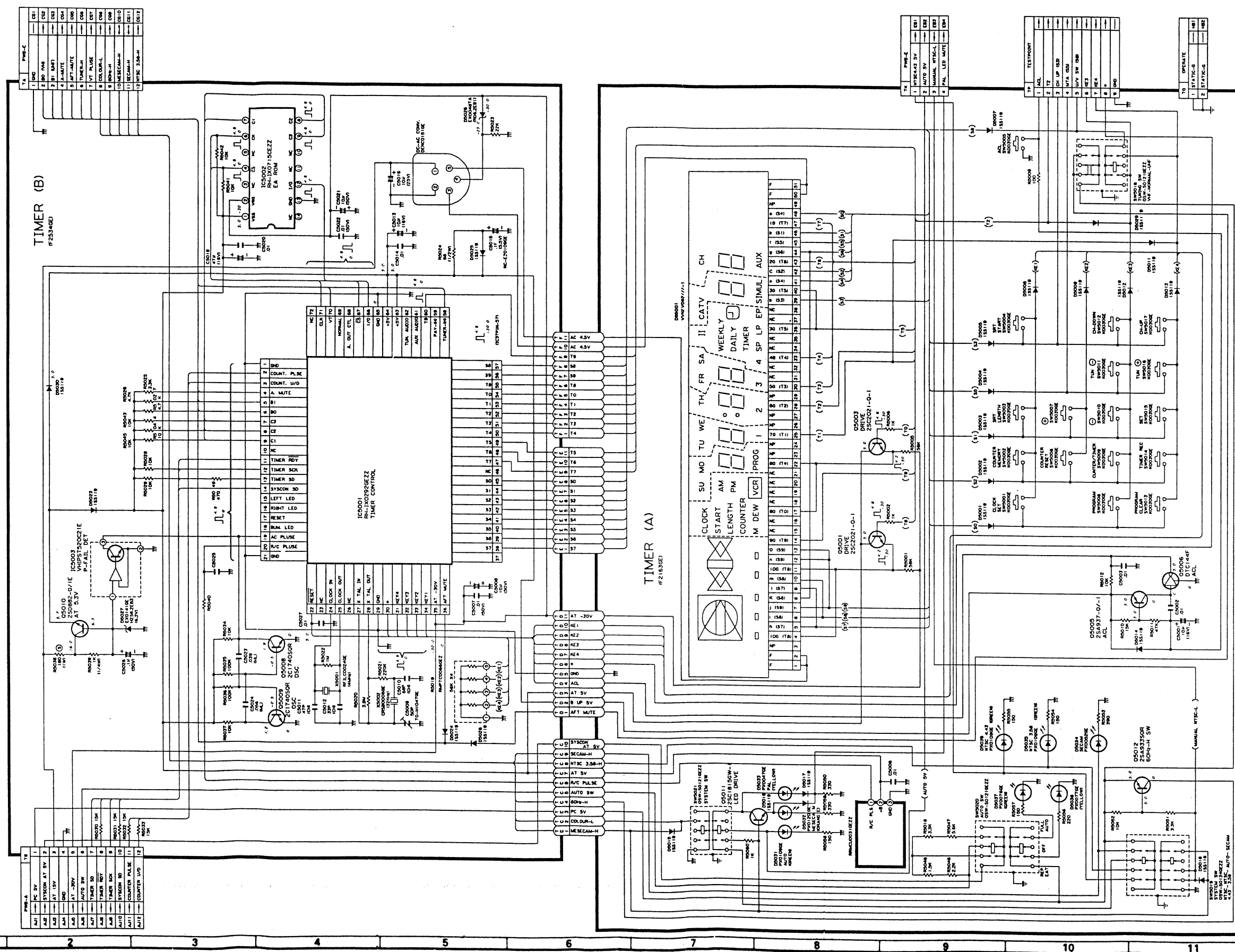


Figure 4-8.

PWB-X, HEAD AMPLIFIER CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Fig. 4-22.

Record signal

(Y signal + chrominance signal)

Playback luminance signal

Playback chrominance signal

VC-779E, VR6843/56, VC-779Z, VC-N70

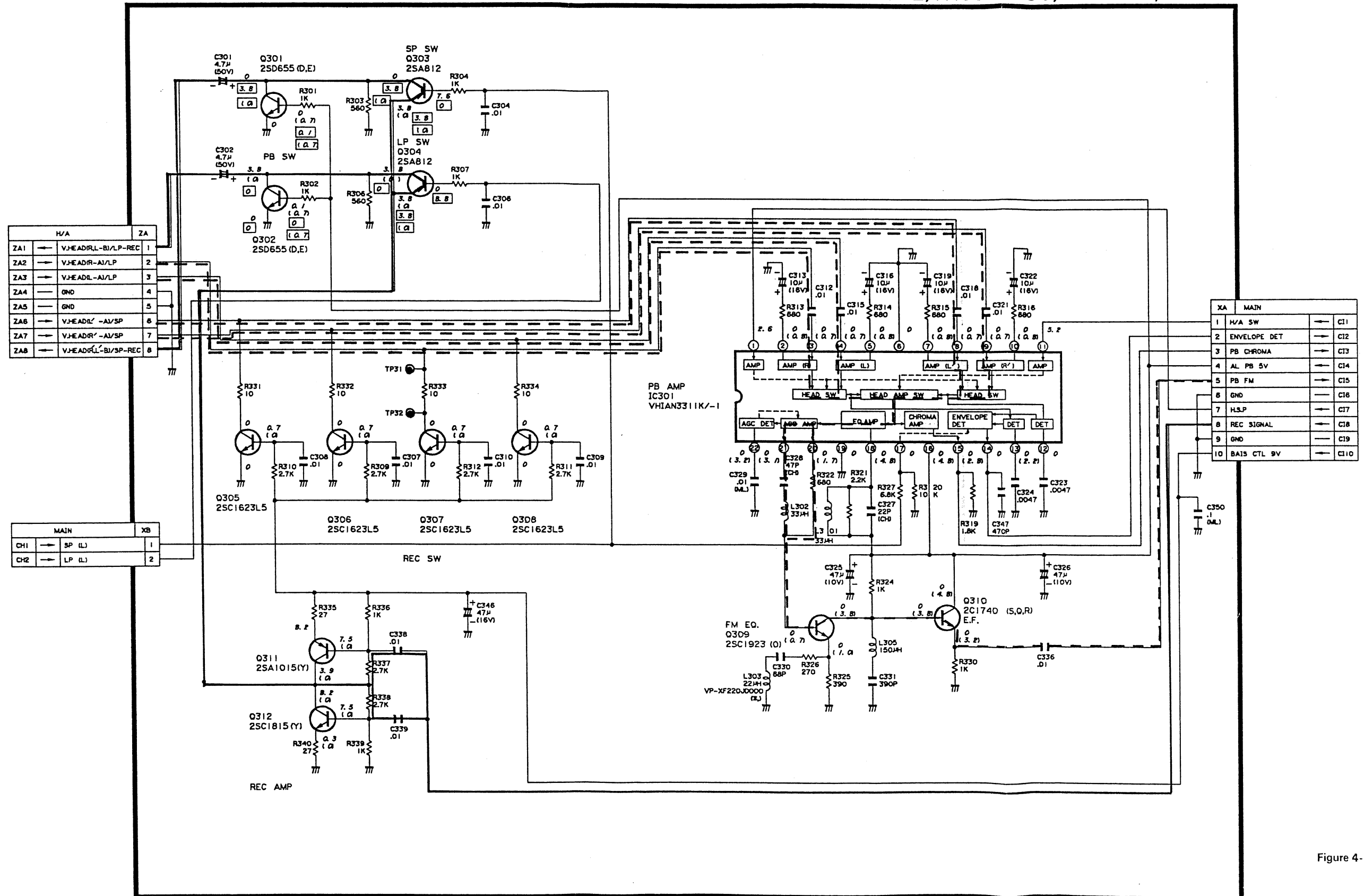


Figure 4-9.

PWB-P, POWER CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Fig. 4-23.

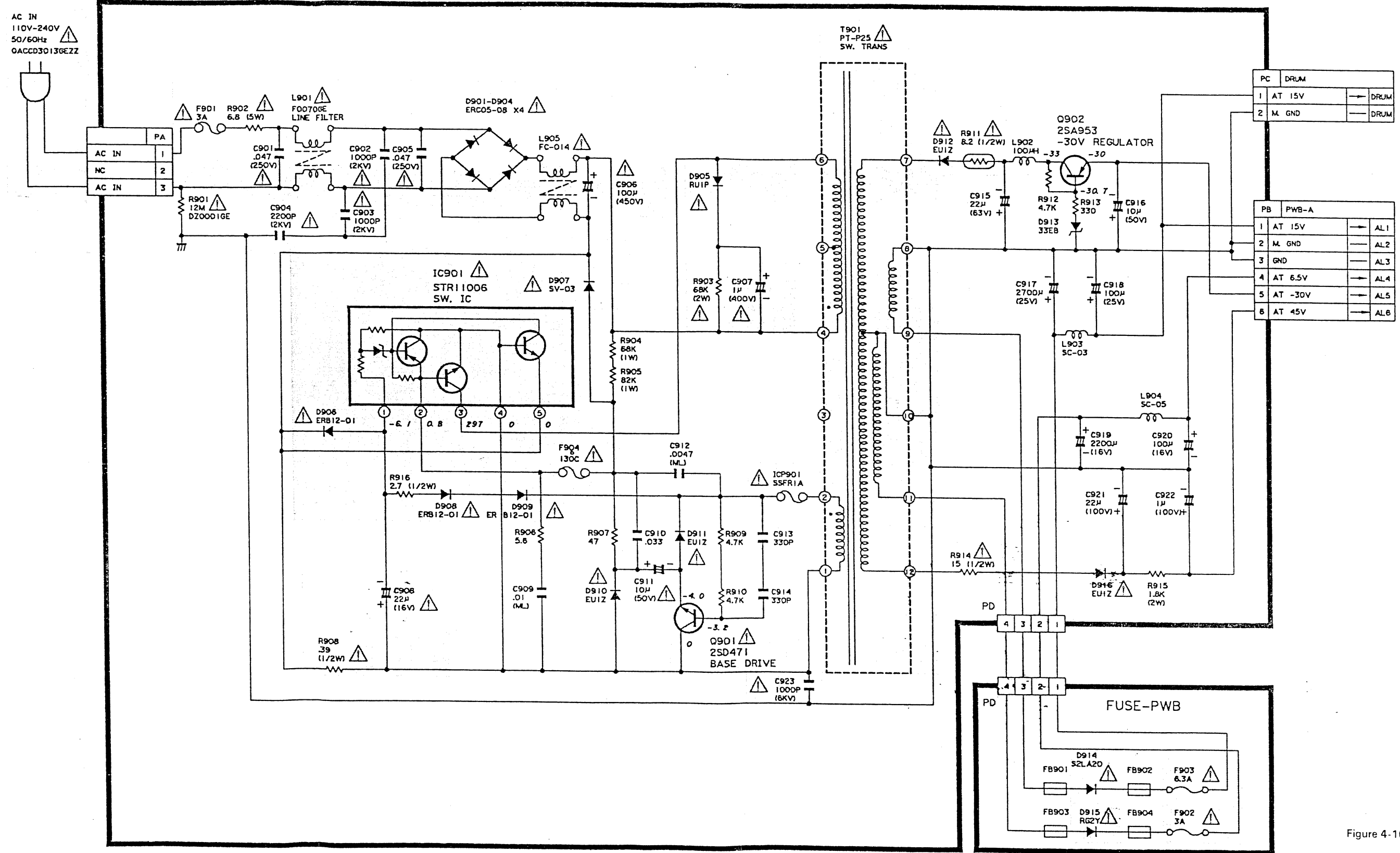


Figure 4-10.

PWB-H, OPERATION CIRCUIT SCHEMATIC DIAGRAM

NOTE: For Wiring Side PWB, refer to Fig. 4-20.

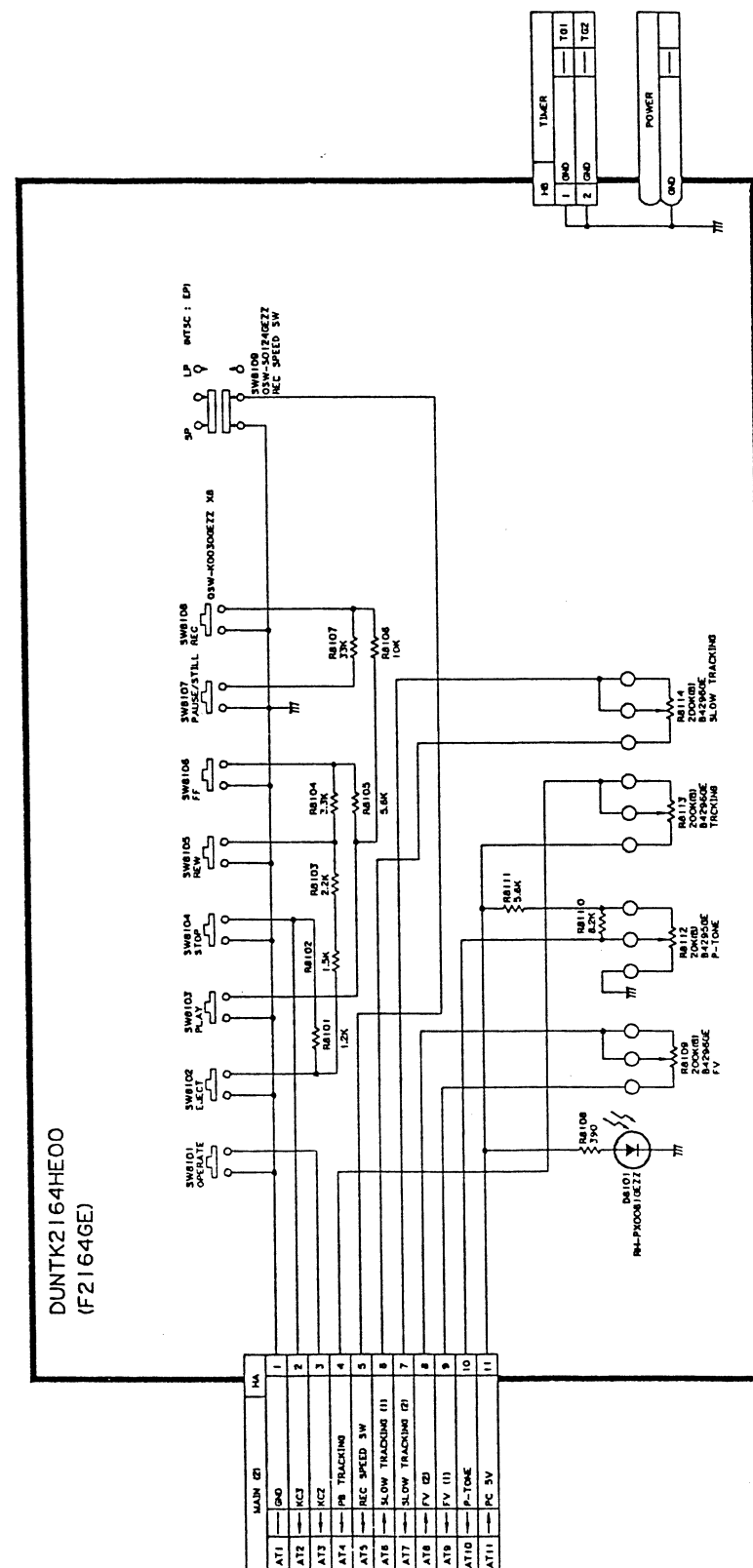


Figure 4-11.

REMOTE CONTROL CIRCUIT SCHEMATIC DIAGRAM

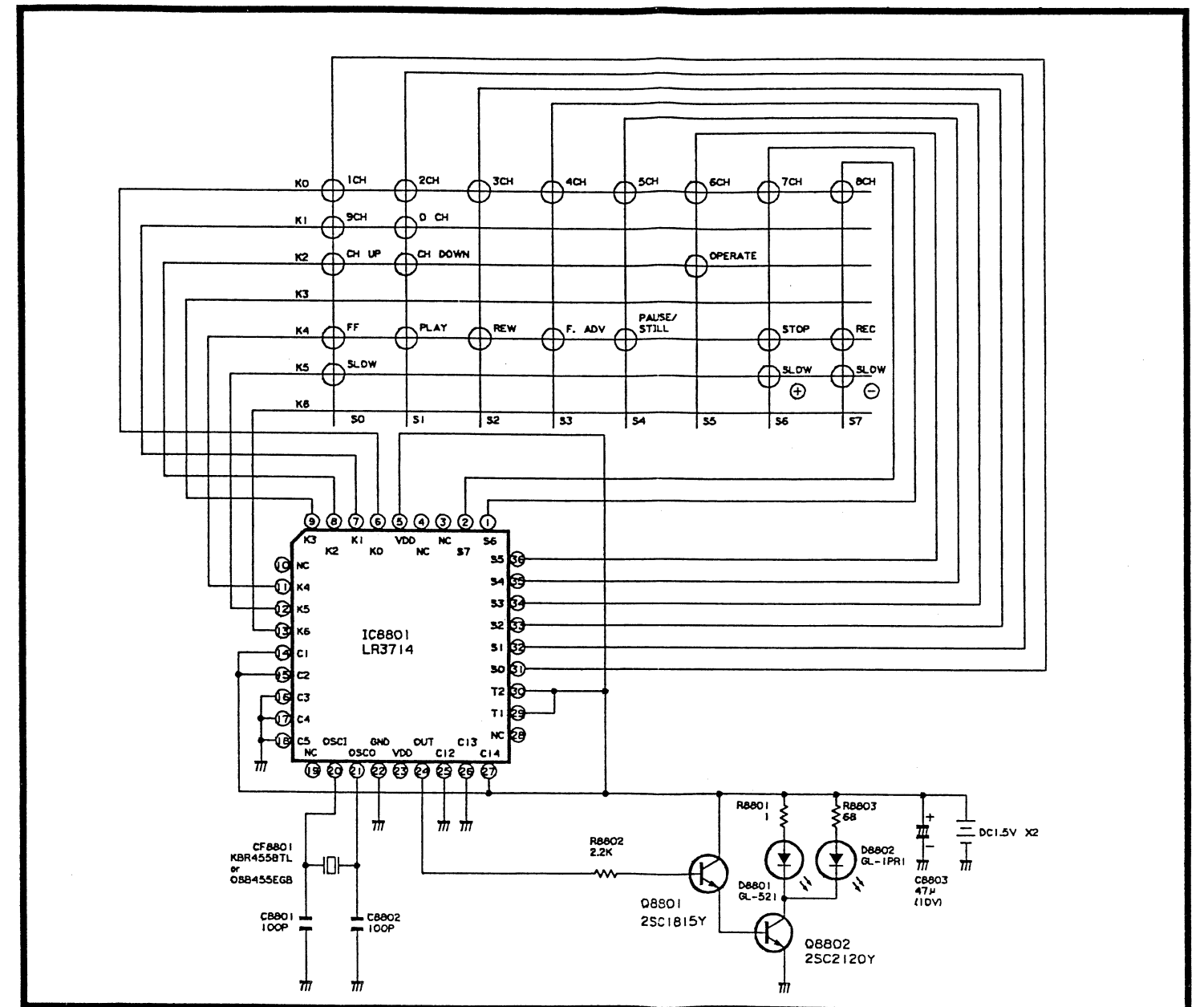
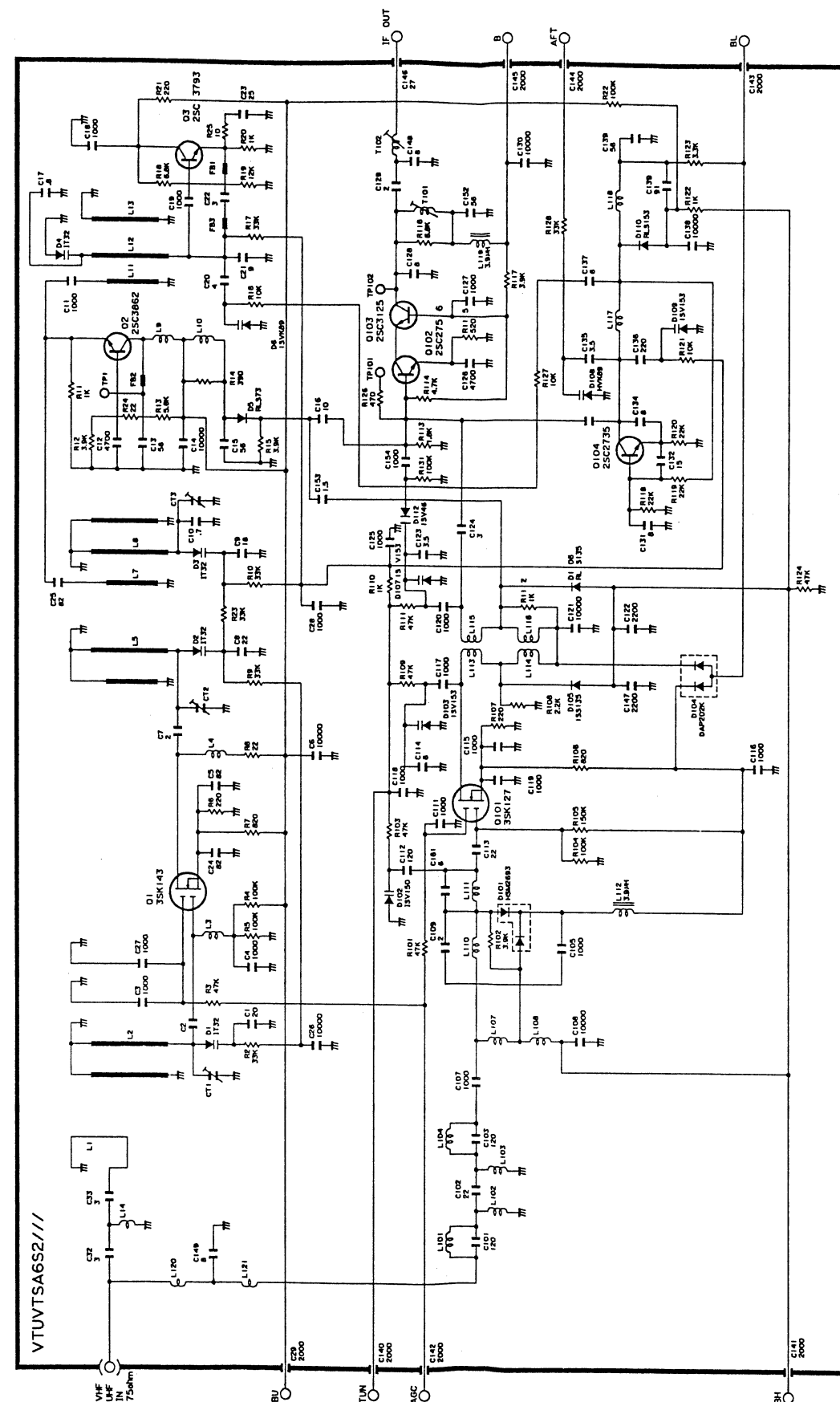
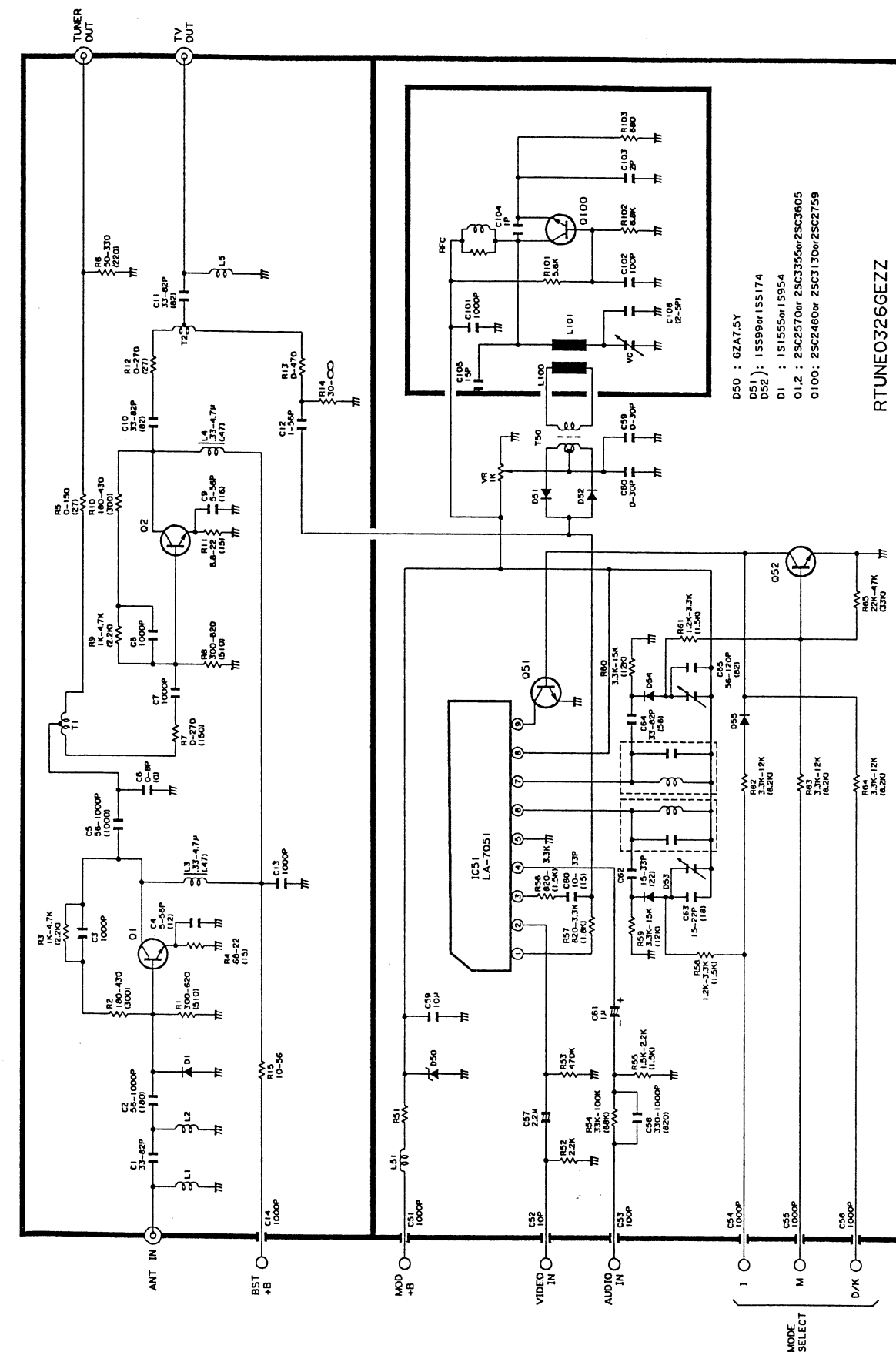


Figure 4-12.

TUNER SCHEMATIC DIAGRAM

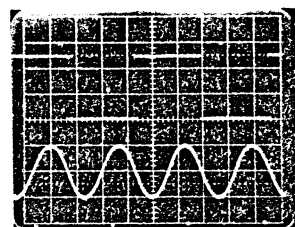


RF CONVERTER SCHEMATIC DIAGRAM

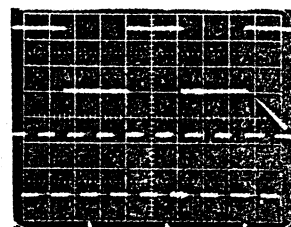


NOTE: For Schematic Diagram, refer to Figs 4-2 and Fig. 4-3.

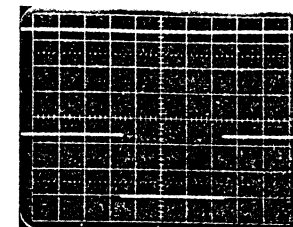
NOTE: For Schematic Diagram, refer to Figs 4-2 and Fig. 4-3.



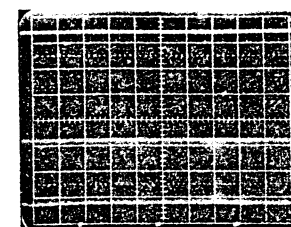
- IC701 (17) pin
Capstan frequency generator pulse
0.5msec/division
2V(DC)/division
-Playback mode-
- IC701 (19) pin
Capstan frequency generator signal
0.5msec/division
0.5V(AC)/division
-Playback mode-



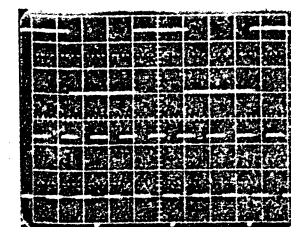
- IC702 ③ pin
Capstan automatic phase control pulse (Pulse width modulation)
50 μ sec/division
2V(DC)/division
-Playback mode-
- IC702 ② pin
Capstan automatic frequency control pulse (Pulse width modulation)
50 μ sec/division
2V(DC)/division
-Playback mode-



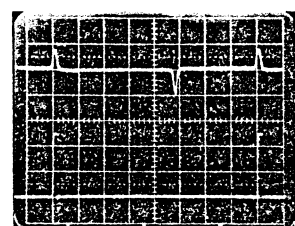
- IC702 (5) pin
Vertical sync pulse
5msec/division
2V(DC)/division
-Record mode-
- IC702 (14) pin
Head switching pulse
5msec/division
2V(DC)/division
-Record mode-



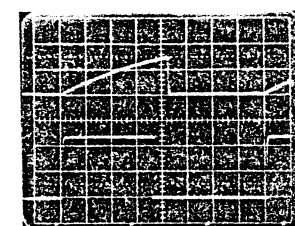
- IC702 5 pin
Vertical sync pulse
5msec/division
2V(DC)/division
-Record mode-
- Q708 emitter
4.43 clock signal
5msec/division
0.2V(AC)/division
-Record mode-



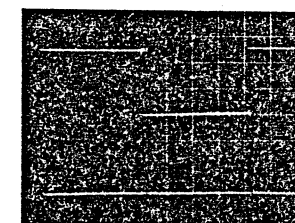
- IC702 $\overline{27}$, pin
Drum automatic phase control pulse (Pulse width modulation)
50 μ sec/division
2V (DC)/division
-Record mode-
- IC702 $\overline{28}$, pin
Drum automatic frequency control pulse (Pulse width modulation)
50 μ sec/division
2V (DC)/division
-Record mode-



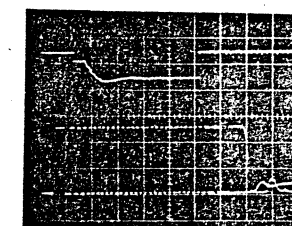
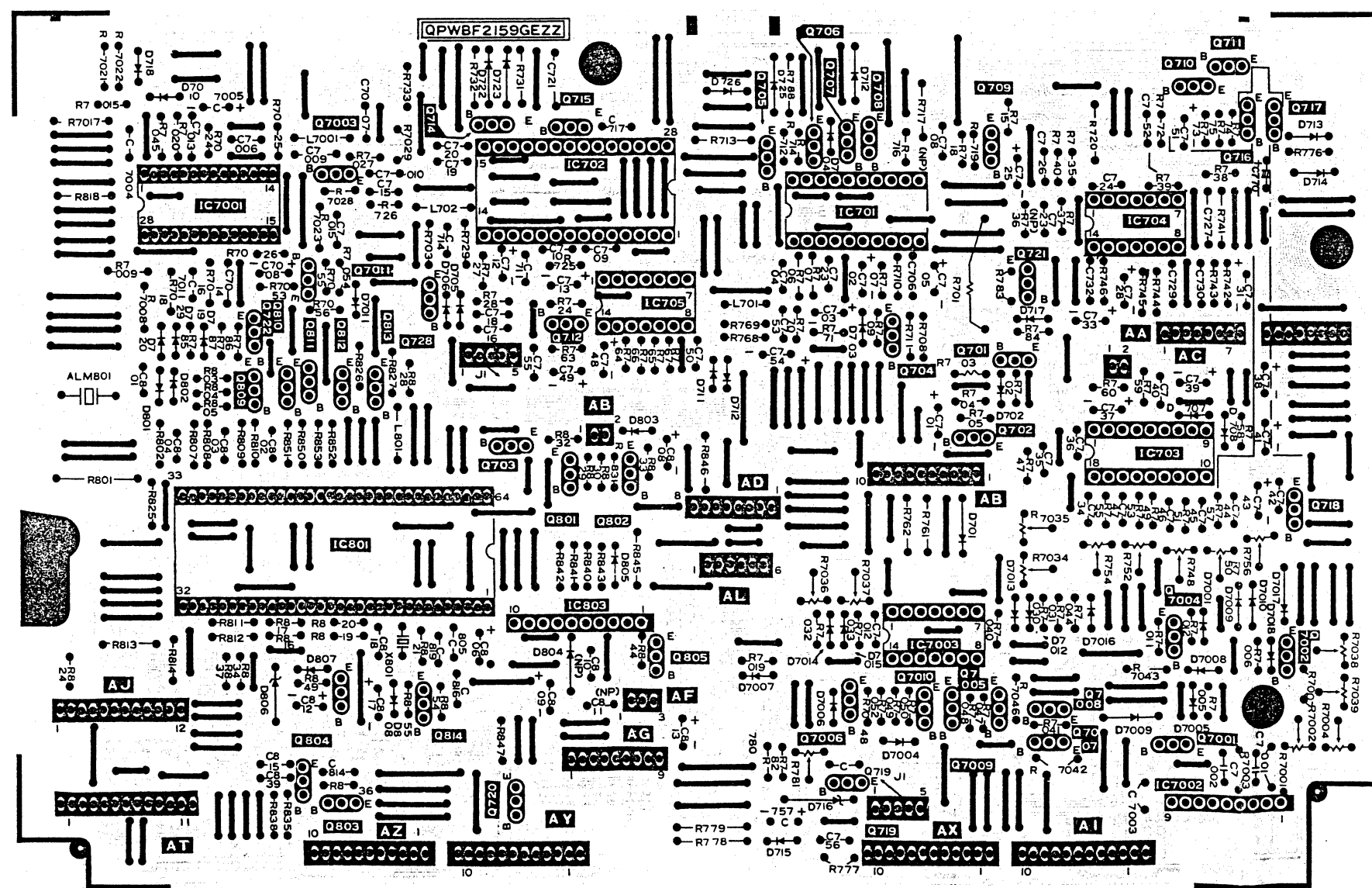
- IC703 ② pin
Playback control signal
5msec/division
2V(DC)/division
-Playback mode-
- IC703 ① pin
Playback control pulse
5msec/division
2V(DC)/division
-Playback mode-



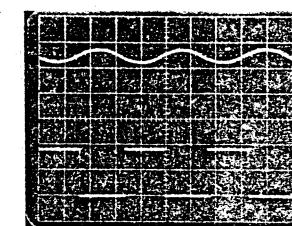
- IC703 (19) pin
Tracking mono-multi signal
5msec/division
2V(DC)/division
-Playback mode-
- IC703 (12) pin
Tracking mono-multi output pulse
5msec/division
2V(DC)/division
-Playback mode-



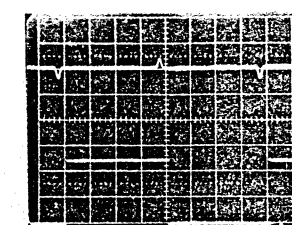
- TP701
Head switching pulse
5msec/division
2V/division (DC)
- False vertical sync pulse
5msec/division
2V/division (DC)
-PAL still mode-



- TP706
Capstan control signal
10msec/division
2V/division (DC)
- IC7001 ⑥ pin
Capstan frequency generator signal
10msec/division
2V/division
-PAL SP slow mode-



- IC705 ⑧: pin
Drum frequency generator signal
0.5msec/division
2V(DC)/division
-Record mode-
- IC705 ⑦: pin
Drum frequency generator pulse
0.5msec/division
2V(DC)/division
-Record mode-

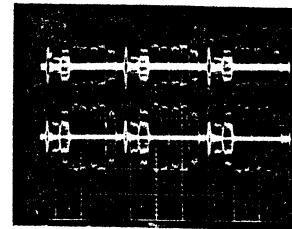


- IC 703 (17) pin
Drum phase generator signal
5msec/division
0.5V(AC)/division
-Record mode-
- IC 703 (14) pin
Head switching pulse
5msec/division
2V(DC)/division
-Record mode-

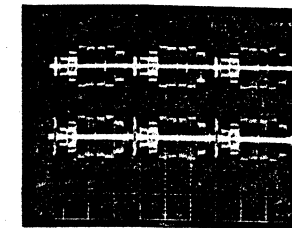
Figure 4-15.

PWB-B, AUDIO/CHROMA CIRCUIT WIRING SIDE PWB

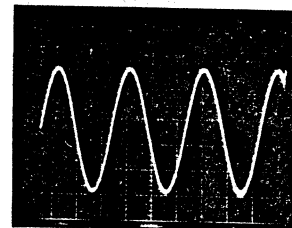
NOTE: For Schematic Diagram, refer to Fig. 4-4.



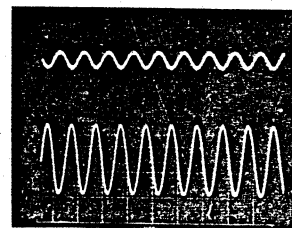
- IC5701 ② pin
Playback chrominance signal
20 μ sec/division
0.1V/division
- IC5701 ③ pin
Playback chrominance signal
20 μ sec/division
0.2V/division
-Playback mode-



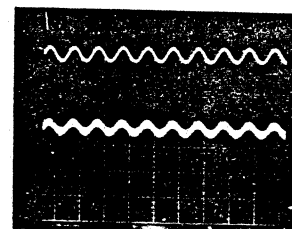
- IC5701 ② pin
NTSC 3.58MHz signal
20 μ sec/division
0.1V/division
- Q5702 Base
NTSC 3.58MHz signal
20 μ sec/division
0.1V/division
-Record mode-



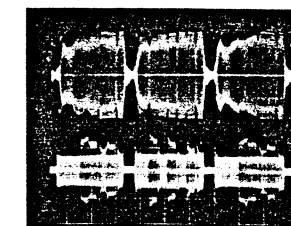
- T601 ⑥ pin
Bias oscillator signal
5 μ sec/division
20V/division
-Record mode-



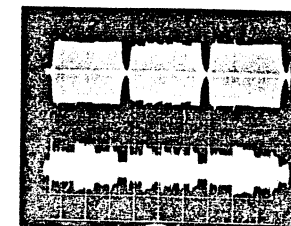
- IC601 ⑩ pin
Audio signal (1kHz)
1msec/division
50mV/division
- IC601 ⑨ pin
Audio signal (1kHz)
1msec/division
0.5V/division
-Playback mode-



- IC601 ① pin
Audio signal
1msec/division
50mV/division
- IC601 ③ pin
Audio signal
1msec/division
50mV/division
-Record mode-



- TP5708
Playback chrominance signal
20 μ sec/division
0.2V/division
- Q5705 Base
Playback chrominance signal
20 μ sec/division
0.1V/division
-SECAM Playback mode-



- TP5708
Chrominance signal
20 μ sec/division
1V/division
- Q5706 Base
Chrominance signal
20 μ sec/division
50mV/division
-SECAM record mode-

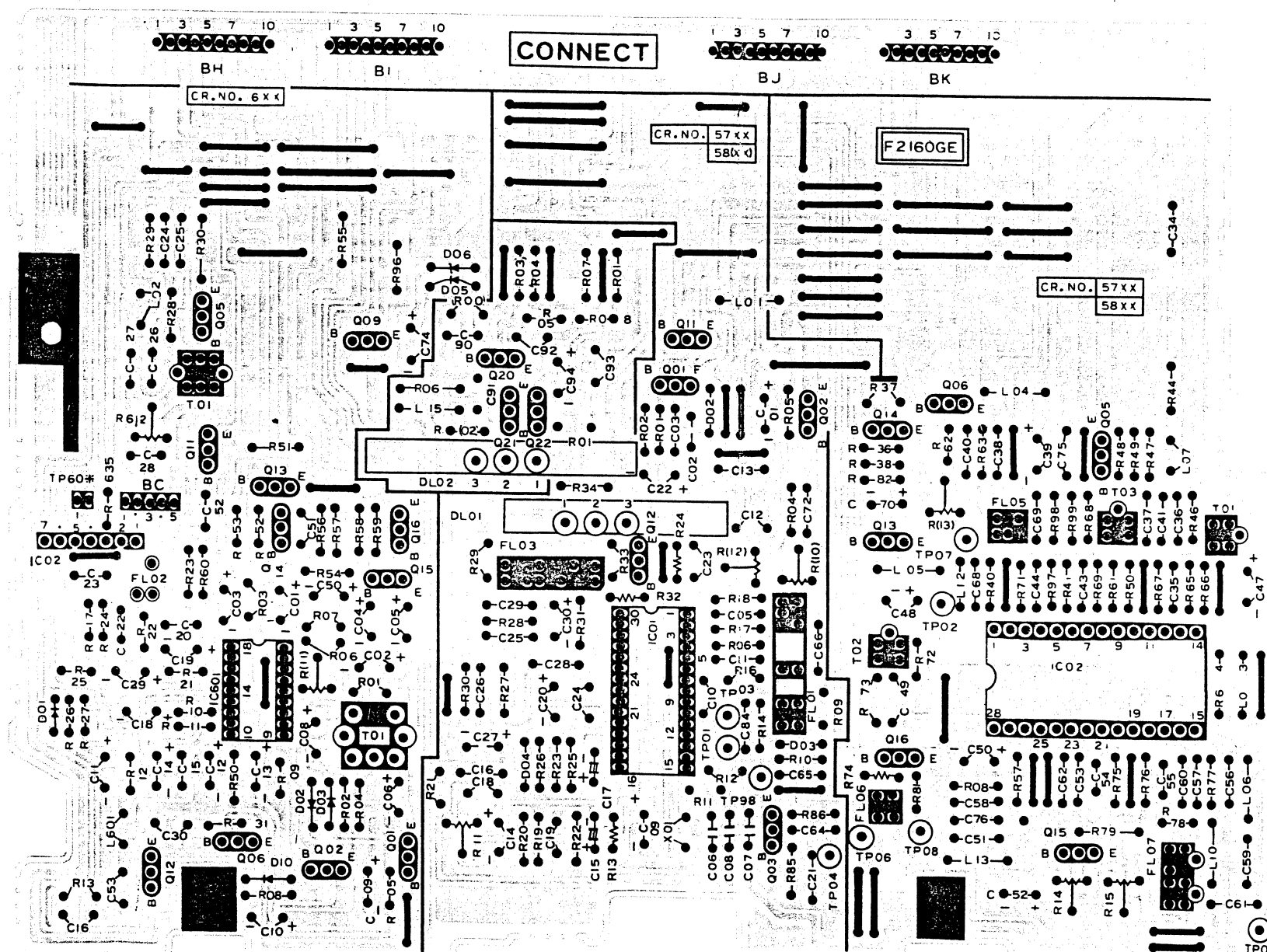
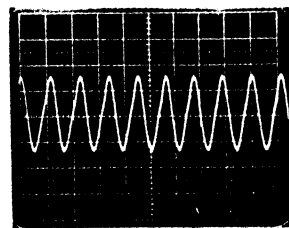


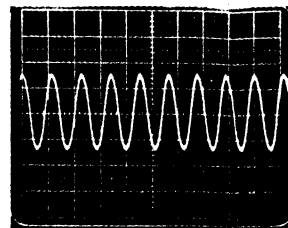
Figure 4-16.

PWB-C, Y/C, IF CIRCUIT WIRING SIDE PWB

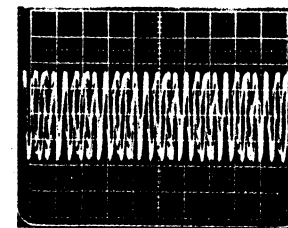
NOTE: For Schematic Diagram, refer to Figs. 4-5 and Fig. 4-6.



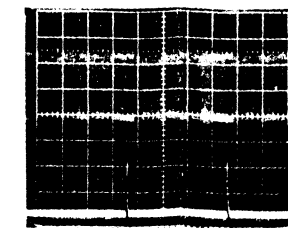
- TP502
4.435572 MHz oscillator signal
0.2 μ sec/division
0.2V(AC)/division
-Record mode-



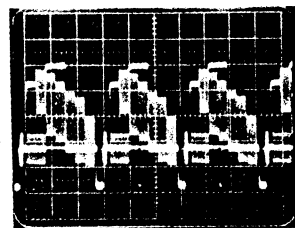
- TP504
4.433619 MHz oscillator signal
0.2 μ sec/division
0.2V(AC)/division
-Playback mode-



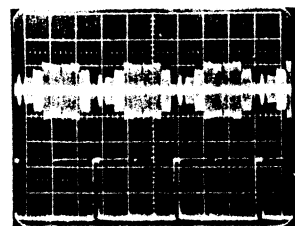
- TP505
Sub-converter output signal
0.5 μ sec/division
0.2V(AC)/division
-Playback mode-



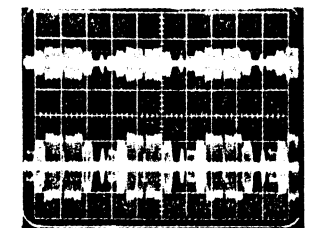
- Connector CE @ pin
Vertical sync pulse
5msec/division
1V(DC)/division
-Record mode-



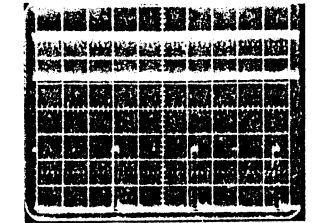
- Video output terminal
(Terminated with 75 ohm resistor)
Video output signal
20 μ sec/division
0.2V(AC)/division
-E-E mode-



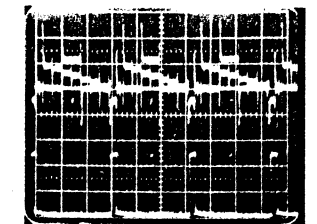
- Q520 emitter
Record chrominance output signal
20 μ sec/division
50mV(AC)/division
-Record mode-
- IC201 @ pin
Horizontal sync pulse
20 μ sec/division
2V(DC)/division
-Record mode-



- Q501, Q502 emitter
Playback chrominance signal
20 μ sec/division
0.5V(AC)/division
-Playback mode-
- Q506, Q507, Q505 emitter
Playback chrominance signal
20 μ sec/division
0.1V(AC)/division
-Playback mode-



- TP202
Luminance FM signal
20 μ sec/division
0.5V(AC)/division
-Record mode-
- IC201 @ pin
Horizontal sync pulse
20 μ sec/division
2V(DC)/division
-Record mode-



- TP201
Preemphasis signal (Y signal)
20 μ sec/division
0.2V(AC)/division
-Record mode-
- IC 201 @ pin
Horizontal sync pulse
20 μ sec/division
2V(DC)/division
-Record mode-

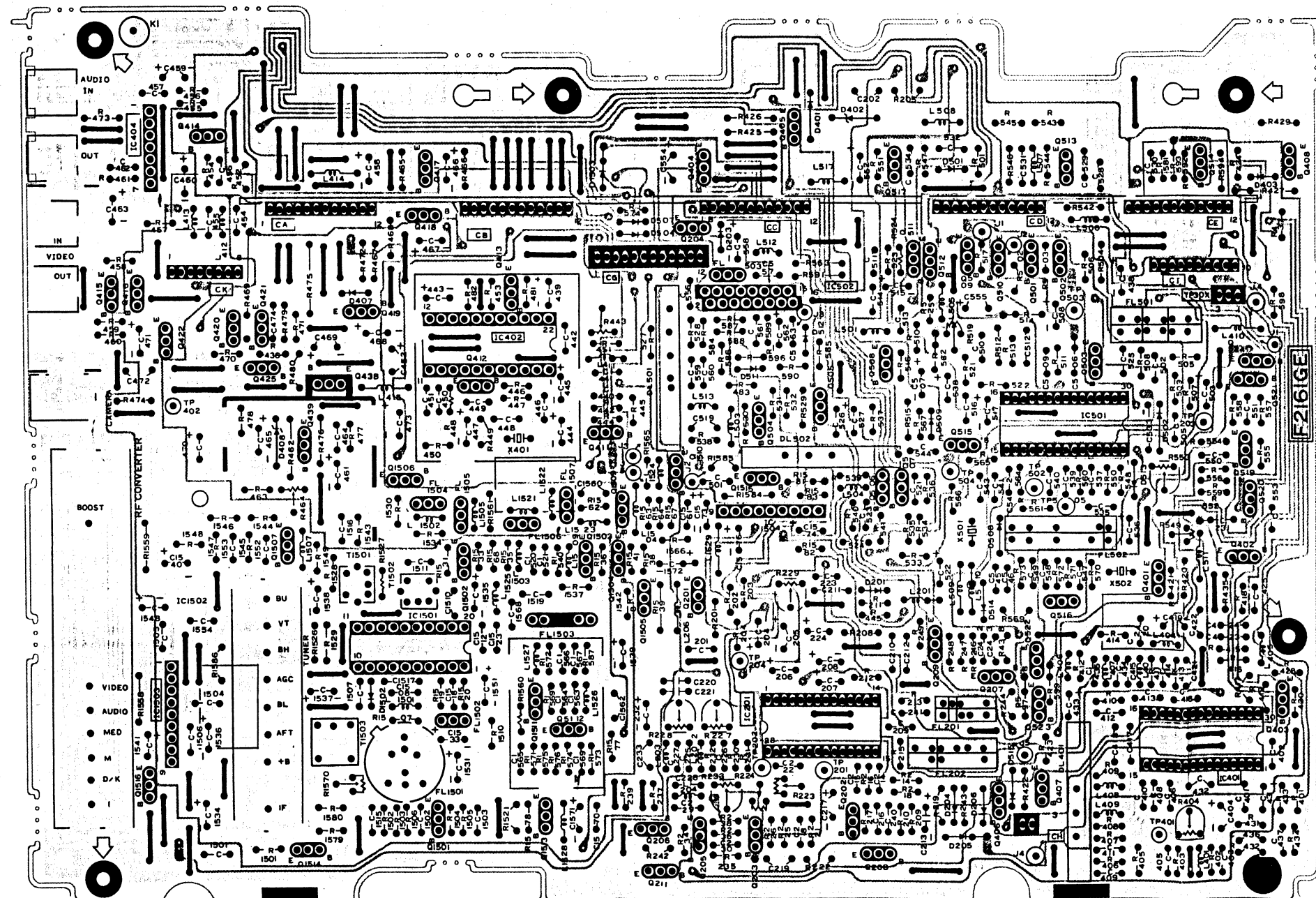


Figure 4-17.

PWB-E, SYSTEM DETECT WIRING SIDE PWB

NOTE: For Schematic Diagram, refer to Fig. 4-8.

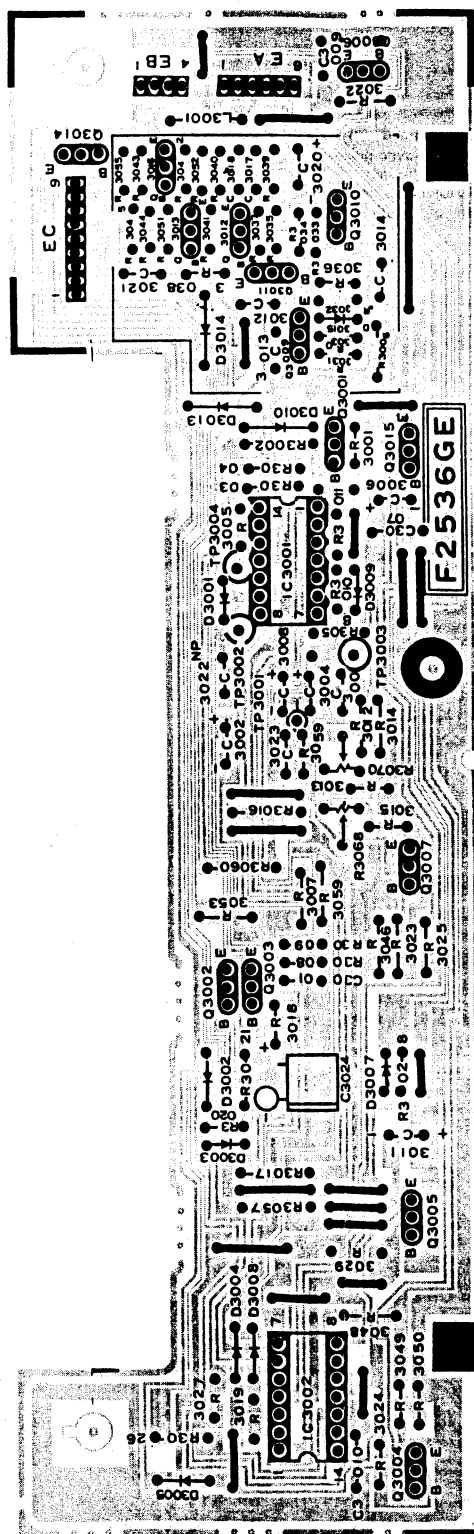
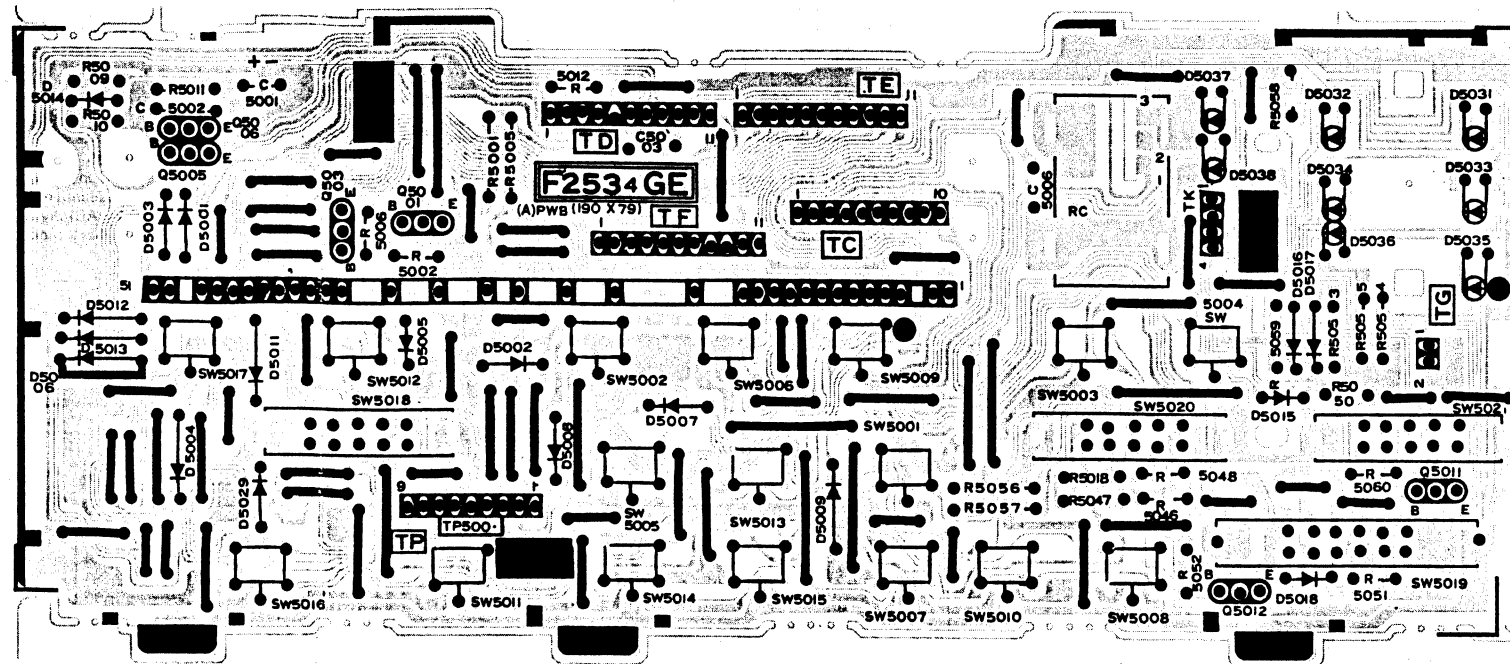


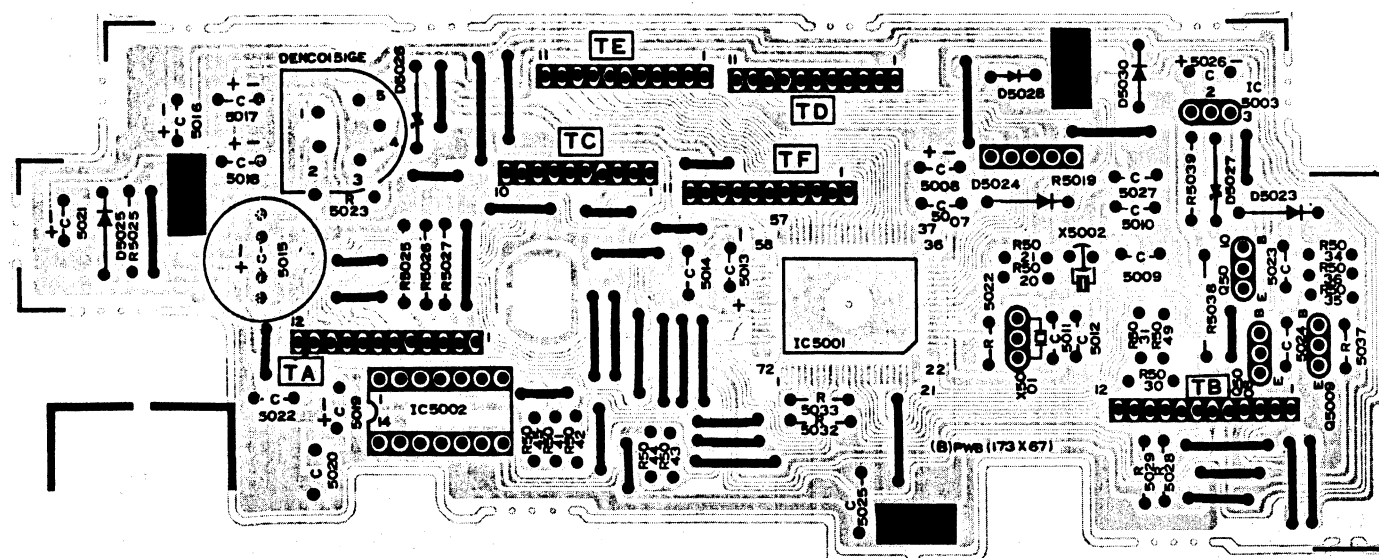
Figure 4-18.

PWB-T, TIMER CIRCUIT WIRING SIDE PWBS

NOTE: For Schematic Diagram, refer to Fig. 3-7.



Timer (A)

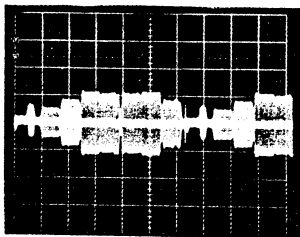


Timer (B)

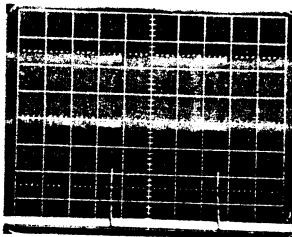
Figure 4-19.

PWB-X, HEAD AMPLIFIER CIRCUIT WIRING SIDE PWB

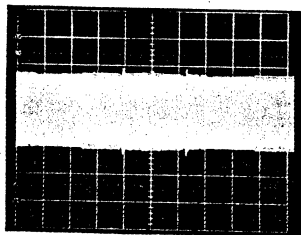
NOTE: For Schematic Diagram, refer to Fig. 4-9.



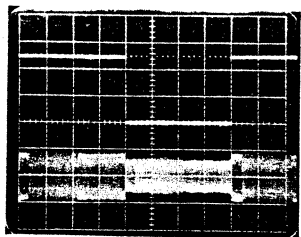
TP31
Chrominance signal
10mV/Division
10 μ sec/Division
—Record mode—



• TP31(+), TP32(-)
Record current
5msec/division
50mV(AC)/division
—Record mode—



TP31
Frequency modulation signal
50mV/Division
10 μ sec/Division
—Record mode—



• TP32
Head switching pulse
5msec/division
2V(DC)/division
—Playback mode—
• TP31
Playback FM output signal
5msec/division
0.2V(AC)/division
—Playback mode—

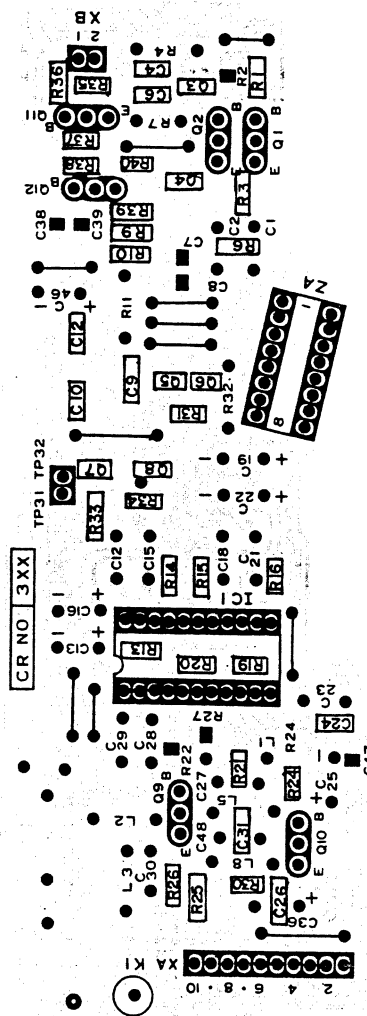


Figure 4-22.

PWB-P, POWER CIRCUIT WIRING SIDE PWB

NOTE: For Schematic Diagram, refer to Fig. 4-10.

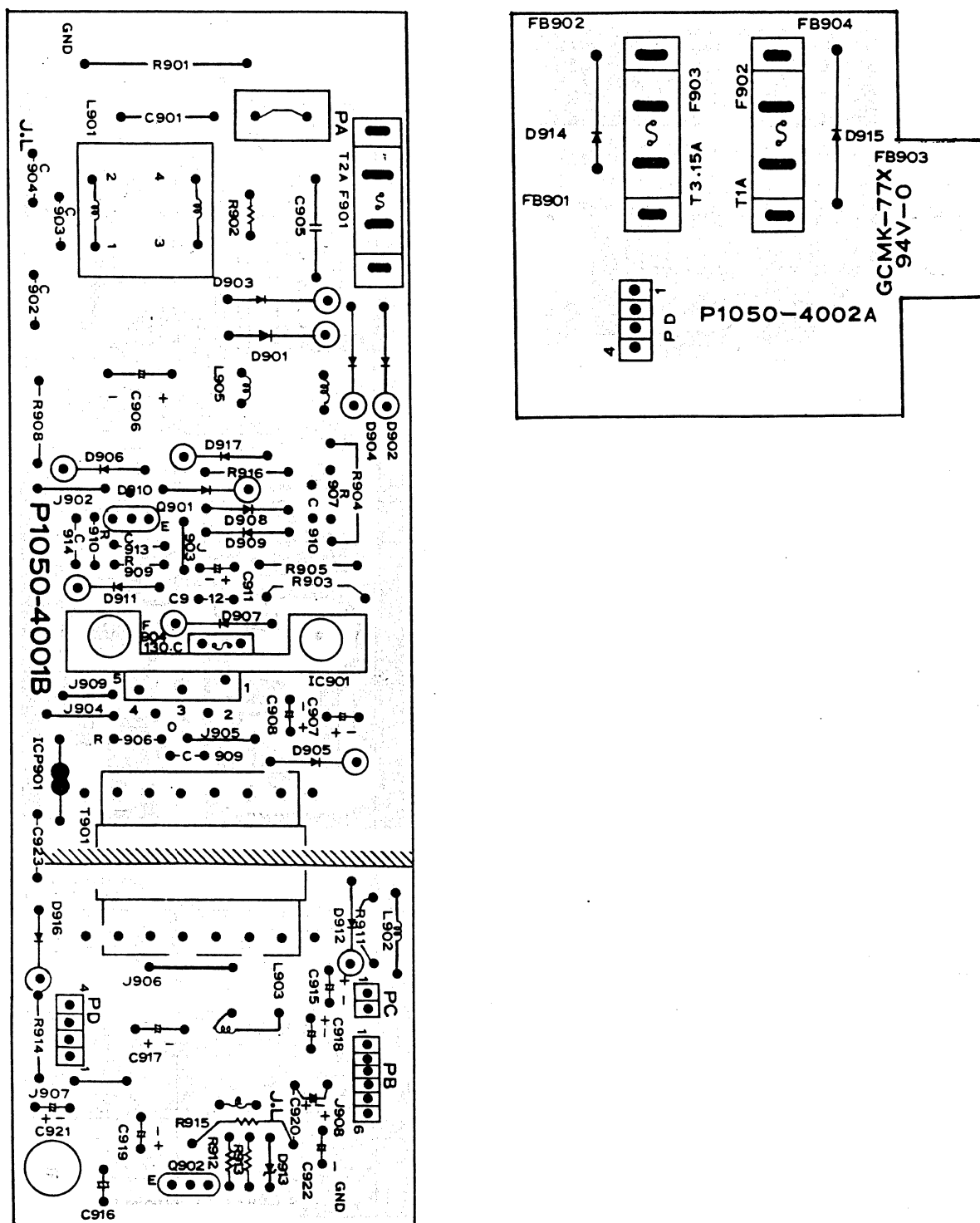


Figure 4-23.

PARTS LIST

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by Δ in the Replacement Parts Lists.

The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION
5. CODE

REF. NO.	PART NO.	DESCRIPTION	CODE
Q802	VS2SC945APQ1E	Switching	AB
Q803	VS2SC945APQ1E	Amplifier, Master pulse	AB
Q804	VS2SC945APQ1E	Amplifier, Slave pulse	AB
Q805	VS2SC2001-K-1	Brake driver	AD
Q807	VS2SC1815YW-1	All time 5V generator	AC
Q809	VS2SC945APQ1E	Switching	AB
Q810	VS2SC945APQ1E	Switching	AB
Q811	VSDTC144ES/-1	Switching	AB
Q812	VSDTC144ES/-1	Switching	AB
Q813	VSDTC144ES/-1	Switching	AB
Q814	VS2SA733APQ1E	Reset pulse generator	AC
Q7001	VS2SC945APQ1E	Switching, 50Hz ON	AB
Q7002	VS2SC945APQ1E	Switching, 60Hz ON	AB
Q7003	VS2SC945APQ1E	Amplifier, Clock	AB
Q7004	VSDTC144ES/-1	Switching	AB
Q7005	VSDTC144ES/-1	Switching	AB
Q7006	VSDTA144ES/-1	Switching	AB
Q7007	VSDTA144ES/-1	Switching	AB
Q7008	VS2SA733APQ1E	Switching, Standard play (High)	AC
Q7009	VS2SC945APQ1E	Switching	AB
Q7010	VS2SC945APQ1E	Switching	AB
Q7011	VS2SA733APQ1E	Switching	AC

REF.NO.	PART NO.	DESCRIPTION	CODE
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PRINTED WIRING BOARD ASS'Y (Not Replacement Item)

PWB-A	DUNTK2159HE52	System control, servo circuit	—
PWB-B	DUNTK2160HE50	Audio chroma circuit	—
PWB-C	DUNTK2161HE53	Y/C, IF circuit	—
PWB-E	DUNTK2536HE50	System detect circuit	—
PWB-H	DUNTK2164HE00	Operation circuit	—
PWB-R	DUNTK2198HE51	TSG. Sub audio circuit	—
PWB-T	DUNTK2534HE50	Timer circuit (A), (B)	—
PWB-W	DUNTK2162HE50	Relay circuit	—
PWB-X	DUNTK2040TM55	Head amplifier circuit	—
PWB-P	RDENC0253GEZZ	Power circuit	—

INTEGRATED CIRCUITS

IC701	VHi AN6359N/-1	Capstan motor input/output control	AU
IC702	RH- i X0162GEZZ	Servo control	AW
IC703	VHi AN6346N/-1	Drum motor input/output control	AQ
IC704	VHi i R3702/-1	Amplifier	AF
IC705	VHi UPD4069U-1	Inverter	AE
IC801	RH- i X0234GEZZ	System control	AX
IC803	VHi BA6238AU-1	Motor driver	AH
IC7001	RH- i X0200GEZZ	Trick control	AT
IC7002	VHi AN3791/-1	Mono-Multi control	AL
IC7003	VHi UPD4081B-1	And gate	AE

PWB-A

TRANSISTORS

Q701	VS2SC2001-K-1	Brake driver	AD
Q702	VS2SD468-C/-1	Brake driver	AD
Q703	VSDTA144ES/-1	Switching	AB
Q704	VS2SC945APQ1E	Amplifier	AB
Q705	VSDTC144ES/-1	Switching	AB
Q706	VSDTA144ES/-1	Switching	AB
Q707	VSDTC144ES/-1	Switching	AB
Q708	VSDTA144ES/-1	Switching	AB
Q709	VS2SA733APQ1E	Switching	AC
Q710	VSDTC144ES/-1	Switching	AB
Q711	VSDTC144ES/-1	Switching	AB
Q712	VS2SC945APQ1E	Amplifier	AB
Q713	VS2SC945APQ1E	Amplifier, Clock	AB
Q714	VSDTC144ES/-1	Switching, 60Hz ON	AB
Q715	VSDTC144ES/-1	Switching, 50Hz ON	AB
Q716	VS2SA733APQ1E	Switching	AC
Q717	VSDTC144ES/-1	Switching	AB
Q718	VSDTC144ES/-1	Switching, 50Hz ON	AB
Q719	VS2SC945APQ1E	Amplifier	AB
Q720	VS2SC1983/-1	Regulator, 5V	AH
Q721	VS2SC945APQ1E	Emitter follower	AB
Q722	VSDTC144ES/-1	Switching, 50Hz ON	AB
Q801	VS2SC945APQ1E	Switching	AB

DIODES

D701	VHDERB1201/-1	Diode (ERB1201)	AB
D702	VHD1SS119/-1	Diode (1SS119)	AB
715			
D716	RH- EX0012GEZZ	Zener diode (RD3.6EB)	AB
D717	VHD1SS119/-1	Diode (1SS119)	AB
726			
D801	VHD1SS119/-1	Diode (1SS119)	AB
803			
D804	RH- EX0163GEZZ	Zener diode (HZS12EB3)	AA
D805	VHD1SS119/-1	Diode (1SS119)	AB
D806	RH- EX0020GEZZ	Zener diode (5.1EB3)	AE
D807, 808	VHD1SS119/-1	Diode (1SS119)	AB
D7001, 7004, 7005, 7007	VHD1SS119/-1	Diode (1SS119)	AB
7018			

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
CAPACITORS							
C708, 723	VCE9EA1HW225M	2.2 μ F, 50V, Electrolytic (non-polar)	AB	AI	QPLGN1089GEZZ	Plug (10 pin)	AE
C741, 748	VCEAEA0JW107M	100 μ F, 6.3V, Electrolytic	AB	AJ	QPLGN1278GEZZ	Plug (12 pin)	AC
C810, 811	VCE9EA1HW105M	1 μ F, 50V, Electrolytic (non-polar)	AC	AL	QPLGN0678GEZZ	Plug (6 pin)	AB
				AT	QPLGN1178GEZZ	Plug (11 pin)	AC
				AX	QPLGN1089GEZZ	Plug (10 pin)	AE
				AY	QPLGN1089GEZZ	Plug (10 pin)	AE
				AZ	QPLGN1089GEZZ	Plug (10 pin)	AE
CONTROLS				PWB-B			
R748	RVR- M4177GEZZ	1M ohm, Pot., 60Hz channel-1 adj.	AB	TRANSISTORS			
R750, 752	RVR- M4171GEZZ	100k ohm, Pot., 50Hz channel-1 adj. 100k ohm, Pot., 50Hz channel-2 adj.	AB	Q601	VSDTC144ES/ - 1	ALC mute	AB
R754	RVR- M4177GEZZ	1M ohm, Pot., 60Hz channel-2 adj.	AB	Q602	VSDTC144ES/ - 1	Record mute	AB
R756	RVR- M4171GEZZ	100k ohm, Pot., Trap. S. T. adj.	AB	Q605	VS2SD468- C/ - 1	Bias oscillation	AD
R781	RVR- M4159GEZZ	1k ohm, Pot., 5V adj.	AB	Q606	VSDTC144ES/ - 1	Switching, PAL mode	AB
R7002, 7004	RVR- M4171GEZZ	100k ohm, Pot., 50Hz long play X-Shift adj. 100k ohm, Pot., 50Hz standard play X-Shift adj.	AB	Q611	VSDTC144ES/ - 1	Long play Mode	AB
R7034, 7035, 7036, 7037	RVR- M4173GEZZ	220k ohm, Pot., PAL stan- dard play tracking preset adj. 220k ohm, Pot., PAL long play tracking preset adj. 220k ohm, Pot., NTSC standard play tracking preset adj.	AB	Q612	VSDTC144ES/ - 1	Switching, EP/LP mode	AB
R7038, 7039	RVR- M4171GEZZ	220k ohm, Pot., NTSC EP tracking preset adj. 100k ohm, Pot., 50Hz false vertical adj. 100k ohm, Pot., 60Hz false vertical adj.	AB	Q613	VSDTC144ES/ - 1	Inverter	AB
COILS				Q614	VS2SD655- DE1E	Tuner mute	AC
L702	VP-DF221K0000	220 μ H	AB	Q615	VSDTA144ES/ - 1	Mute	AB
L7001	VP-DF221K0000	220 μ H	AB	Q616	VS2SD655- DE1E	Aux. mute	AC
RESISTOR				Q5701	VS2SC945APQ1E	Switching, Playback output	AB
R701	VRS- VV3LB101J	100 ohm, 3W, Metal oxide	AB	Q5702	VS2SC945APQ1E	Switching, Record chro- minance output (NTSC)	AB
MISCELLANEOUS				Q5703	VS2SC945APQ1E	3.58MHz oscillation output	AB
X801	RFiLC0039GEZZ	Filter	AE	Q5705	VS2SC945APQ1E	Switching, Playback chro- minance output (SECAM)	AB
ALM801	RALMB0007GEZZ	Alarm	AE	Q5706	VS2SC945APQ1E	Record chrominance output (SECAM)	AB
AA	QPLGN0278GEZZ	Plug (2 pin)	AA	Q5709	VS2SC1815YW- 1	5.5V regulator	AC
AB	QPLGN1078GEZZ	Plug (10 pin)	AC	Q5711	VS2SA733APQ1E	Switching, Record chrominance	AC
AC	QPLGN0778GEZZ	Plug (7 pin)	AC	Q5712	VS2SA733APQ1E	Amplifier, Playback chrominance	AC
AD	QPLGN0878GEZZ	Plug (8 pin)	AC	Q5713	VS2SA733APQ1E	Switching, Record 5V	AC
AE	QPLGN0278GEZZ	Plug (2 pin)	AA	Q5714	VS2SA733APQ1E	Switching, Record 5V	AC
AF	QPLGN0378GEZZ	Plug (3 pin)	AB	Q5715	VSDTC144ES/ - 1	Switching, Playback gate	AB
				Q5716	VS2SA733APQ1E	Amplifier	AC
				Q5720	VS2SA733APQ1E	Amplifier, PAL colour	AC
				Q5721	VS2SC945APQ1E	Switching, PAL colour amp.	AB
				Q5722	VS2SC945APQ1E	Switching, PAL colour amp.	AB
				INTEGRATED CIRCUITS			
				IC601	VHi AN3990/ / - 1	Amplifier, Audio	AK
				IC602	VHi UPC1513H- 1	Head Switching, Record/ Playback	AH
				IC5701	VHi HA11845NT1	NTSC 3.58MHz colour	AW
				IC5702	VHi BA7107/ / - 1	SECAM, Colour	AT
				DIODES			
				D601, 602, 603, 610	VHD1SS119/ / - 1	Diode (1SS119)	AB
				D5702	VHD1SS119/ / - 1	Diode (1SS119)	AB
				5705 D5706	RH- EX0010GEZZ	Zener diode	AG

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
CAPACITORS				BH, BI, BJ, BK	QPLGN1089GEZZ	Plug (10 pin)	AE
C606	VCEAGA1AW107M	100μF, 10V, Electrolytic	AB				
C627	VCQPKA2AA153J	0.015μF, 100V, Polypro	AB				
C5720	VCEAGA1CW107M	100μF, 16V, Electrolytic	AB				
CONTROLS				PWB-C			
				TRANSISTORS			
R5810	RVR- M4160GEZZ	1.5k ohm, Pot., Record chrominance level adj. (NTSC)	AB	Q201	VS2SC945APQ1E	Switching, Sync signal	AB
R5811	RVR- M4165GEZZ	10k ohm, Pot., Automatic phase control adj. (NTSC)	AB	Q202	VS2SA733APQ1E	Switching, High quality	AC
R5812	RVR- M7163TAZZ	10k ohm, Pot., Automatic frequency control adj. (NTSC)	AE	Q203	VSDTC144ES/ - 1	Switching, NTSC mode	AB
				Q204	VSDTA144ES/ - 1	Switching, E-E mode	AB
				Q205	VS2SA733APQ1E	Amplifier, Record FM	AC
				Q206	VS2SA733APQ1E	Emitter follower	AC
R5813	RVR- M4160GEZZ	1.5k ohm, Pot., Record chrominance level adj. (SECAM)	AB	Q207	VS2SC1815YW- 1	Switching, NTSC	AC
				Q208	VSDTC144ES/ - 1	Switching, High quality	AB
R5814,	RVR- M4164GEZZ	6.8k ohm, Pot., Gate 1 adj.	AB	Q209	VS2SC945APQ1E	Amplifier, Colour signal	AB
5815		6.8k ohm, Pot., Gate 2 adj.		Q211	VSDTC144ES/ - 1	Switching, EP	AB
R6611	RVR- M4168GEZZ	33k ohm, Pot., Playback level adj.	AB	Q401	VS2SA733APQ1E	Switching, After loading playback (High)	AC
R6612	RVR- M4174GEZZ	330k ohm, Pot., Record Bias adj.	AB				
COILS AND TRANSFORMERS				Q402	VS2SA733APQ1E	Switching, Playback	AC
L601	RCi LP0015GEZZ	8.2mH	AD	Q403	VS2SC945APQ1E	Switching	AB
L602	VP- YF471K0000	470μH	AC	Q404	VS2SC1815YW- 1	Luminance 5V regulator	AC
L5701,	VP- DF221K0000	220μH	AB	Q405	VS2SC1815YW- 1	Colour 5V regulator	AC
5703,				Q406	VSDTC144ES/ - 1	Head switching	AB
5704				Q407	VSDTC144ES/ - 1	Head switching	AB
L5705	VP- DF101K0000	100μH	AB	Q408	VSDTA144ES/ - 1	Switching, 50Hz	AB
L5706	VP- XF221K0000	220μH	AB	Q411	VS2SA733APQ1E	Emitter follower	AC
L5707	VP- MK471K0000	470μH	AB	Q412	VS2SC945APQ1E	17MHz oscillation	AB
L5710	VP- XF390K0000	39μH	AB	Q413	VS2SC945APQ1E	Amplifier, Low pass filter	AB
L5712	VP- XF221K0000	220μH	AB	Q414	VS2SA733APQ1E	Amplifier, Video	AC
L5713	VP- DF221K0000	220μH	AB	Q415	VS2SC945APQ1E	Video output	AB
L5715	VP- XF120K0000	12μH	AB	Q416	VS2SC945APQ1E	Video output	AB
FL601	RCi LF0016GEZZ	Low pass filter	AG	Q417	VS2SA733APQ1E	Bias 9V output	AC
FL602	RCi Li 0052GEZZ	Bias trap	AE	Q418	VS2SB772- PQ- 1	Power control 9V output	AD
FL5701	RMPTD0224GEZZ	4.2MHz band pass filter/ 1.2MHz low pass filter	AG	Q419	VS2SC945APQ1E	Charge coupled device 8V output	AB
FL5703	RMPTD0222GEZZ	3.58MHz band pass filter	AK	Q420	VS2SA733APQ1E	Power control 15V	AC
FL5705	RMPTD0223GEZZ	1.3MHz low pass filter	AE	Q421	VS2SC945APQ1E	Charge coupled device 12V output	AB
FL5706	RMPTD0257GEZZ	4.3MHz band pass filter	AD				
FL5707	RMPTD0149GEZZ	4.3MHz band pass filter	AH	Q422	VSDTC144ES/ - 1	Camera pause	AB
DL5701	RCi LZ0187GEZZ	Delay line	AQ	Q425	VS2SC945APQ1E	Error amp., 12V regulator	AB
DL5702	RCi LZ0183GEZZ	Delay line	AK	Q438	VS2SC1983/ / - 1	9.5V regulator	AH
T601	RTRNH0046GEZZ	Bias oscillator transformer	AE	Q439	VS2SC945APQ1E	Amplifier, Error	AB
T5701,	RCi LV0013GEZZ	Playback bell	AF	Q501	VS2SA733APQ1E	Emitter follower	AC
5702		1.1MHz bell		Q502	VS2SA733APQ1E	Emitter follower	AC
T5703	RCi LV0015GEZZ	4.4MHz bell	AF	Q503	VS2SC945APQ1E	Emitter follower	AB
MISCELLANEOUS				Q504	VS2SA733APQ1E	Amplifier	AC
X5701	RCRSB0009GEZZ	Crystal oscillator (3.58MHz)	AL	Q505	VS2SC945APQ1E	Emitter follower	AB
BC	QPLGN0578GEZZ	Plug (5 pin)	AB	Q506	VS2SC945APQ1E	Emitter follower	AB
				Q507	VS2SC945APQ1E	Emitter follower	AB
				Q508	VS2SC945APQ1E	Switching, Automatic phase control (PAL)	AB
				Q509	VS2SC945APQ1E	Playback chrominance output (PAL)	AB
				Q510	VSDTA144ES/ - 1	Switching, Record/ Playback	AB
				Q511	VSDTC144ES/ - 1	Switching, Automatic phase control	AB
				Q512	VSDTC144ES/ - 1	Trick mode	AB
				Q513	VS2SA733APQ1E	Amplifier, Playback	AC
				Q514	VS2SC945APQ1E	Switching, HSP	AB
				Q515	VS2SC945APQ1E	4.43MHz output	AB
				Q516	VS2SC945APQ1E	4.44MHz oscillation	AB
				Q517	VS2SA733APQ1E	Emitter follower	AC

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
Q519	VS2SA733APQ1E	Amplifier, Record chrominance signal	AC	C458	VCEAGA1CW107M	100 μ F, 16V, Electrolytic	AB
Q520	VS2SC945APQ1E	Emitter follower	AB	C463	VCEAGA1AW477M	470 μ F, 10V, Electrolytic	AC
Q521	VSDTC144ES/-1	Switching, NTSC	AB	C555	VCEAGA1AW107M	100 μ F, 10V, Electrolytic	AB
Q522	VSDTA144ES/-1	SECAM Long Play killer	AB	CONTROLS			
Q523	VSDTC144ES/-1	SECAM Long Play killer	AB	R223,	RVR- M7164TAZZ	10k ohm, Pot., Deviation adj.	AE
Q524	VSDTA144ES/-1	SECAM Long Play killer	AB	224		10k ohm, Pot., Carrier adj.	
Q1501	VS2SC1906//1E	Amplifier, Intermediate frequency	AC	R227,	RVR- M4169GEZZ	47k ohm, Pot., Dark clip adj.	AB
Q1502	VS2SA733APQ1E	Emitter follower	AC	228,		47k ohm, Pot., White clip adj.	
Q1503	VS2SC945APQ1E	Amplifier, Colour signal	AB	229		47k ohm, Pot., E-E level adj.	
Q1504	VS2SC945APQ1E	Amplifier, Sync signal	AB	R233	RVR- M4159GEZZ	1k ohm, Pot., Record FM luminance level adj.	AB
Q1505	VS2SA733APQ1E	Amplifier, Inverter signal	AC	R404	RVR- M4169GEZZ	47k ohm, Pot., Playback luminance level adj.	AB
Q1506	VSDTC144ES/-1	AFT mute	AB	R443	RVR- M4159GEZZ	1k ohm, Pot., Trick level adj.	AB
Q1507	VS2SC383-WT-1	Voltage control	AE	R464	RVR- M4160GEZZ	1.5k ohm, Pot., 9.5V adj.	AB
Q1509	VS2SA733APQ1E	Video output (NTSC)	AC	R519	RVR- M7164TAZZ	10k ohm, Pot., Automatic phase control adj.	AE
Q1510	VS2SC945APQ1E	Amplifier, Sync signal	AB	R549	RVR- M7134TAZZ	6.8k ohm, Pot., Automatic frequency control adj.	AC
Q1511	VS2SC945APQ1E	Mixer	AB	R553	RVR- M4160GEZZ	1.5k ohm, Pot., Record chrominance level adj. (PAL)	AB
Q1512	VS2SA733APQ1E	Amplifier, 12MHz	AC	R1570	RVR- M7162TAZZ	4.7k ohm, Pot., Radio frequency automatic gain control adj.	AE
Q1513	VSDTC144ES/-1	Switching, Audio level (NTSC)	AB	COILS AND TRANSFORMERS			
Q1514	VS2SC1815YW-1	Switching, NTSC trap	AC	L201	VP-MK101K0000	100 μ H	AB
Q1515	VSDTC144ES/-1	Switching, Video input	AB	L202	VP- XF151K0000	150 μ H	AB
Q1516	VSDTC144ES/-1	Switching, NTSC	AB	L203	VP- XF680K0000	68 μ H	AB
Q1517	VSDTC144ES/-1	Switching	AB	L204	VP- XF151K0000	150 μ H	AB
INTEGRATED CIRCUITS				L206	VP- XF221K0000	220 μ H	AB
IC201	VHiAN3215K/-1	EE/Record Y signal control	AT	L401	VP- XF121K0000	120 μ H	AB
IC401	VHiAN3321K/-1	Playback Y signal control	AR	L402	VP- XF150K0000	15 μ H	AB
IC402	VHiTL8605P/-1	Charge coupled device	AW	L404	VP- XF121K0000	120 μ H	AB
IC404	VHiTA7347P/-1	Switching, Charge coupled device	AG	L405	VP- XF680K0000	68 μ H	AB
IC501	VHiHA11871NT1	PAL/ME-SECAM colour control	AV	L406	VP-MK101K0000	100 μ H	AB
IC502	VHiBA7007// -1	ME-SECAM selector	AM	L407	VP- XF151K0000	150 μ H	AB
IC1501	RH-IX0212GEZZ	PIF/SIF detector	AM	L408,	VP- XF120K0000	12 μ H	AB
IC1502	VHiUPC574JT-1	Regulator, 31.6V	AC	409			
IC1503	RH-IX0203GEZZ	Band switching	AE	L410,	VP- DF221K0000	220 μ H	AB
IC1504	VHiBA7021// -1	Switching, Video input	AE	411			
DIODES				L412	VP- XF220K0000	22 μ H	AB
D201,	VHD1SS119// -1	Diode (1SS119)	AB	L413	VP- XF330K0000	33 μ H	AB
203				L414	VP- DF680K0000	68 μ H	AB
206				L415	VP- DF101K0000	100 μ H	AB
D401	VHD1SS119// -1	Diode (1SS119)	AB	L501	RCi LP0015GEZZ	8.2mH	AD
D402	RH- EX0020GEZZ	Zener diode (5.1EB)	AE	L503,	VP- XF150K0000	15 μ H	AB
D403,	VHD1SS119// -1	Diode (1SS119)	AB	504			
407				L505	VP- XF221K0000	220 μ H	AB
D408	RH- EX0010CEZZ	Zener diode	AG	L506	VP- MK561K0000	560 μ H	AB
D501,	VHD1SS119// -1	Diode (1SS119)	AB	L507,	VP- XF221K0000	220 μ H	AB
502,				511			
504,				L512	VP- YF153J0000	15mH	AC
507,				L513	RCi LP0014GEZZ	6.8mH	AD
508,				L517	VP- XF221K0000	220 μ H	AB
509,				L1501	VP- XF1R2K0000	1.2 μ H	AB
511							
515							
D1502,	VHD1SS119// -1	Diode (1SS119)	AB				
1503							
CAPACITORS							
C224	VCEAGA1AW227M	220 μ F, 10V, Electrolytic	AB				

REF.NO.	PART NO.	DESCRIPTION	CODE	REF.NO.	PART NO.	DESCRIPTION	CODE
L1502	VP- XF100K0000	10μH	AB	PWB-E			
L1503	VP- XF390K0000	39μH	AB	TRANSISTORS			
L1504	VP- DF680K0000	68μH	AB	Q3001	V S 2 S A 9 3 3 A P Q 1 E	Switching, 60Hz 5V	AB
L1505	VP- XF100K0000	10μH	AB	Q3002	V S 2 S A 9 3 7 - Q / - 1	Switching, NTSC 3.58	AC
L1507	VP- XF120K0000	12μH	AB	Q3003	V S 2 S A 9 3 7 - Q / - 1	Switching, NTSC 5V	AC
L1509	VP- XF4R7K0000	4.7μH	AB	Q3004	V S D T C 1 4 4 F / / - 1	Switching, Auto detect mute	AB
L1521, 1522	VP- XF100K0000	10μH	AB	Q3005	V S D T A 1 4 4 E S / - 1	Inverter	AB
L1523	VP- XF820K0000	82μH	AB	Q3006	V S 2 C 1 7 4 0 S Q R 1 E	Amplifier, V-SYNC	AC
L1524	VP- XF101K0000	100μH	AB	Q3007	V S 2 C 1 7 4 0 S Q R 1 E	Inverter	AC
L1525	VP- XF220K0000	22μH	AB	Q3009	V S 2 C 1 7 4 0 S Q R 1 E	Switching, Playback detect	AC
L1526	VP- XF3R3K0000	3.3μH	AB	Q3010	V S 2 S A 9 3 3 S Q R 1 E	Inverter	AB
L1527	VP- XF150K0000	15μH	AB	Q3011	V S 2 C 1 7 4 0 S Q R 1 E	Amplifier	AC
L1528, 1529	VP- XF221K0000	220μH	AB	Q3012	V S 2 S A 9 3 3 S Q R 1 E	DC bias	AB
FL201	RMPTD0219GEZZ	3MHz low pass filter	AG	Q3013	V S 2 S A 9 3 3 S Q R 1 E	Amplifier	AB
FL202	RMPTD0220GEZZ	Equalizer	AK	Q3014	V S D T C 1 4 4 E S / - 1	Switching, Playback	AB
FL501	RMPTD0221GEZZ	4.43MHz band pass filter	AK	Q3015	V S 2 C 1 7 4 0 S Q R 1 E	Switching	AC
FL502	RMPTD0239GEZZ	1.4MHz low pass filter/ 5.06MHz band pass filter	AG	Q3016	V S 2 C 1 7 4 0 S Q R 1 E	DC bias	AC
FL503	RFiLC0029TAZZ	4.5MHz filter	AD	INTEGRATED CIRCUIT			
FL1501	RFiLC0066GEZZ	Surface acoustic wave filter	AK	IC3001	V H i U P C 3 3 9 C / - 1	50/60Hz system detect	AH
FL1502	RFiLC0040GEZZ	Detector, 5.5MHz	AE	IC3002	V H i U P D 4 0 0 1 B - 1	Nor date	AE
FL1503	RFiLC0061CEZZ	Filter, 5.5MHz	AF	DIODES			
FL1504	RFiLC0020CEZZ	Trap, 5.5MHz	AE	D3001,	V H D 1 S S 1 1 9 / / - 1	Diode (ISS119)	AB
FL1505	RFiLC0024CEZZ	Trap, 6.5MHz	AE	D3002,	V H D 1 S S 1 1 9 / / - 1		
FL1506	RFiLC0023CEZZ	Trap, 6MHz	AE	D3003,	V H D 1 S S 1 1 9 / / - 1		
FL1507	RFiLC0013CEZZ	Trap, 4.5MHz	AE	D3004,	V H D 1 S S 1 1 9 / / - 1		
DL401	RCiLZ0199GEZZ	Drop out, PAL	AM	D3005,	V H D 1 S S 1 1 9 / / - 1		
DL501	RCiLZ0191GEZZ	2H delay, PAL	AM	D3008,	V H D 1 S S 1 1 9 / / - 1		
DL502	RCiLZ0195GEZZ	1H delay, NTSC 4.43MHz	AR	D3009,	V H D 1 S S 1 1 9 / / - 1		
T1501	RCiLD0130CEZZ	Detector, PIF	AD	D3010,	V H D 1 S S 1 1 9 / / - 1		
T1502	RCiLD0017GEZZ	Detector, AFT	AD	D3013,	V H D 1 S S 1 1 9 / / - 1		
T1503	RCiLi0371CEZZ	Trap, NTSC	AD	D3014,	V H D 1 S S 1 1 9 / / - 1		
				D3015,	V H D 1 S S 1 1 9 / / - 1		
RESISTOR				CAPACITOR			
R475	VRN-VV3DB4R7J	4.7 ohm, 2W, Metal oxide	AA	C3006	V C E A E A 1 A W 1 0 7 M	100μF, 16V, Electrolytic	AB
MISCELLANEOUS				CONTROLS			
X401	VTUVTSA6S2Z / /	VHF tuner	BG	R3068	R V R - M 4 3 7 1 G E Z Z	10k ohm, Pot., Playback detect adj.	AC
X501	RTUNE0326GEZZ	Radio frequency converter	BE	R3070	R V R - M 4 3 7 1 G E Z Z	10k ohm, Pot., Record detect adj.	AC
	RCRSB0067GEZZ	Crystal oscillator, 17MHz	AG	COIL			
	RCRSB0002CEZZ	Crystal oscillator, 4.43MHz	AM	L3001	V R - X F 2 2 1 K 0 0 0 0	200μH	AB
X502	RCRSB0049GEZZ	Crystal oscillator, 4.44MHz	AK	MISCELLANEOUS			
CA, CB, CC, CD	QPLGN1272GEZZ	Plug (12 pin)	AD	EA	Q P L G N 0 6 8 0 G E Z Z	Plug (6 pin)	AB
CE	QPLGN1072GEZZ	Plug (10 pin)	AC	EB	Q P L G N 0 4 8 0 G E Z Z	Plug (4 pin)	AB
CG	QPLGN1278GEZZ	Plug (12 pin)	AC	EC	Q P L G N 0 7 7 8 G E Z Z	Plug (7 pin)	AB
CH	QPLGN0278GEZZ	Plug (2 pin)	AA				
CI	QPLGN1078GEZZ	Plug (10 pin)	AC				
CK	QPLGN0878GEZZ	Plug (8 pin)	AC				
	QJAKE0058GEZZ	Jack, Camera pause	AC				
	QJAKZ0006GEZZ	Jack, Video in/out	AK				
	QJAKE0055GEZZ	Jack, Audio in/out	AD				

REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
PWB-H				PWB-T			
DIODE				TRANSISTORS			
D8101	RH- PX0061GEZZ	LED, Operation	AG	Q5001	VS2SC2021- Q- 1	LED drive	AB
CONTROLS				Q5003	VS2SC2021- Q- 1	LED drive	AB
R8109	RVR- B4296GEZZ	200k ohm, Pot., False vertical sync adj.	AD	Q5005	VS2SA937- Q/ - 1	All clear	AC
R8112	RVR- B4295GEZZ	20k ohm, Pot., Picture tone adj.	AD	Q5006	VSDTC144F / - 1	All clear	AB
R8113, 8114	RVR- B4296GEZZ	200k ohm, Pot., Tracking adj. 200k ohm, Pot., Slow tracking adj.	AD	Q5008	VS2C1740SQR1E	Oscillator	AC
MISCELLANEOUS				Q5009	VS2C1740SQR1E	Oscillator	AC
SW8101, 8102, 8103, 8104, 8105, 8106, 8107, 8108	QSW- K0030GEZZ	Switch, Operation Switch, Eject Switch, Playback Switch, Stop Switch, Rewind Switch, Fast-forward Switch, Pause/Still Switch, Record	AB	Q5010	VS2SD882- Q/ 1E	All time 5.3V	AD
SW8109	OSW-S0124GEZZ	Switch, Record speed	AD	Q5011	VS2SC1815GW- 1	LED drive	AB
PWB-R				Q5012	VS2SA933SQR1E	Head switching, 60Hz	AB
TRANSISTORS				INTEGRATED CIRCUITS			
Q1601	VS2SC945APQ1E	Switching, Mode	AB	IC5001	RH- i X0292GEZZ	Timer control	AX
Q1602	VS2SC945APQ1E	Switching, Mode	AB	IC5002	RH- i X0715CEZZ	EA ROM	AT
Q1603	VS2SC945APQ1E	Emitter follower	AB	IC5003	VHi PST520C21E	Detector, Power fail	AE
Q1604	VS2SA733APQ1E	Emitter follower	AC	DIODES			
INTEGRATED CIRCUIT				D5001	VHD1SS119 / - 1	Diode (1SS119)	AB
IC1601	VHi BA7004 / - 1	Test signal generator	AK	5005, 5007, 5008, 5009, 5011			
DIODES				5018, 5023, 5024, 5025			
D1601, 1602	VHD1SS119 / - 1	Diode (1SS119)	AB	D5026	RH- EX0048TAZZ	Zener diode (RD6.2EB1)	AB
COIL				D5027	RH- EX0141GEZZ	Zener diode (HZS6.2EB3)	AB
L1601	VP- XF270K0000	27μH	AB	D5028, 5029, 5030	VHD1SS119 / - 1	Diode (1SS119)	AB
MISCELLANEOUS				D5031	RH- PX0109GEZZ	LED, Auto play (Green)	AC
X1601	RFi LA0009CEZZ	Filter, 11.5MHz	AF	D5032	RH- PX0120GEZZ	LED, ME-SECAM (Orange)	AC
X1602	RFi LA0013CEZZ	Filter, 12MHz	AF	D5033	RH- PX0047GEZZ	LED, PAL (Yellow)	AD
X1603	RFi LA0010CEZZ	Filter, 10MHz	AF	D5034	RH- PX0052GEZZ	LED, SECAM	AB
X1604	RFi LA0005GEZZ	Filter	AE	D5035, 5036	RH- PX0109GEZZ	LED, NTSC 3.58MHz (Green) LED, NTSC 4.43MHz (Green)	AC
SW1601, 1602	QSW- S0092CEZZ	Switch, TSG/Alarm	AE	D5037	RH- PX0076GEZZ	LED, Full auto (Green)	AC
RA	QPLGN0878GEZZ	Plug (8 pin)	AC	D5038	RH- PX0077GEZZ	LED, Repeat (Yellow)	AC
				TRIMMER			
				C5009	RTō- H1047GEZZ	50pF, 32kHz oscillator adj.	AC
				RESISTORS			
				R5019	RMPTC0066GEZZ	56k ohm x 4, Packaged circuit	AB
				R5038	VRS- VV3AB181J	180 ohm, 1W, Metal oxide	AA

REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
MISCELLANEOUS				Q308	VS2SC1623L 51E	Switching, Record	AB
X5001	RDENC0151GEZZ	DC-AC converter	AM	Q309	VS2SC1923- 01E	FM equalizer	AD
X5002	RFi LCO024GEZZ	Ceramic filter, 4MHz	AE	Q310	VS2C1740SQR1E	Emitter follower	AC
DG5001	RCRSB0006GEZZ	Crystal oscillator, 32KHz	AK	Q311	VS2SA1015Y/ 1E	Amplifier, Record	AC
SW5001,	VVKFV092/ / - 1	Fluorescent display tube	AY	Q312	VS2SC1815YW- 1	Amplifier, Record	AC
5002,	QSW- K0030GEZZ	Switch, Clock set	AB	INTEGRATED CIRCUIT			
5003,		Switch, Counter memory		IC301	VHi AN3311K/ - 1	Amplifier, Playback	AS
5004,		Switch, Length (Simple recording timer)		COILS			
5005,		Switch, Start (Simple recording timer)		L301,	VP- XF330J0000	33 μ H	AB
5006,		Switch, All clear		302			
5007,		Switch, Counter reset		L303	VP- XF220J0000	22 μ H	AB
5008,		Switch, Minute +		L305	VP- XF151K0000	150 μ H	AB
5009,		Switch, Program		MISCELLANEOUS			
5010,		Switch, Counter/Timer		XA	QPLGN1080GEZZ	Plug (10 pin)	AC
5011,		Switch, Minute -		XB	QPLGN0280GEZZ	Plug (2 pin)	AB
5012,		Switch, Tuning -		ZA	QSDCN0896GEZZ	Socket (8 pin)	AC
5013,		Switch, Channel down		THE OTHER PARTS			
5014,		Switch, Program clear					
5015,		Switch, Timer recording					
5016,		Switch, Setting					
5017,		Switch, Tuning +					
SW5018	QSW- S0121GEZZ	Switch, Channel up	AB				
SW5019	QSW- S0134GEZZ	Switch, VHF/Normal/UHF	AD				
SW5020,	QSW- S0121GEZZ	Switch, System	AB				
5021		Switch, Auto					
TA,	QPLGN1278GEZZ	Switch, System	AC				
TG	QPLGN0280GEZZ	Plug (12 pin)	AB				
	RRMCU0031GEZZ	Remote control receiver	AP				
PWB-W							
MISCELLANEOUS							
WA,	QSDCN1089GEZZ	Socket (10 pin)	AD	PWB-P			
WB,				TRANSISTORS			
WC,				ΔQ901	95KUAD0038AZ	Base drive	AF
WD,				Q902	95KUAA0019AZ	All time-30V regulator	AD
WE,				INTEGRATED CIRCUIT			
WG							
WH	QSDCN1272GEZZ	Socket (12 pin)	AD				
WI	QSDCN1072GEZZ	Socket (10 pin)	AD				
WJ,	QSDCN1272GEZZ	Socket (12 pin)	AD	ΔIC901	95KUCZ0121ZZ	Switching	AT
WK,				DIODES			
WL							
WW,	QSDCN1089GEZZ	Socket (10 pin)	AD				
WX							
PWB-X				ΔD901,	95KUBC0098BZ	Diode (ERC05-08)	AE
TRANSISTORS				Δ 902,			
Q301	VS2SD655- DE1E	Switching, Playback	AC	Δ 903,			
Q302	VS2SD655- DE1E	Switching, Playback	AC	Δ 904			
Q303	VS2SA812- M51E	Switching, Standard play	AC	ΔD905,	95KUBC0128AA	Diode (RU1P)	AB
Q304	VS2SA812- M51E	Switching, Long play	AC	ΔD906,	95KUBZ0008ZZ	Diode (ERB12-01)	AC
Q305	VS2SC1623L 51E	Switching, Record	AB	Δ 908,			
Q306	VS2SC1623L 51E	Switching, Record	AB	Δ 909			
Q307	VS2SC1623L 51E	Switching, Record	AB	ΔD907,	95KUBZ0031ZZ	Diode (SV03YS)	AG
				ΔD910,	95KUBC0143AA	Diode (EU1Z)	AD
				Δ 911,			
				Δ 912,			
				Δ 916			
				ΔD913,	95KUBD0135AZ	Diode (RD33EB)	AC
				ΔD914,	95KUBC0176AZ	Diode (S2LA20)	AF

REF. NO.	PART NO.	DESCRIPTION	CODE	REF.NO.	PART NO.	DESCRIPTION	CODE
△D915,	95KUBC0141AA	Diode (RG2Y)	AF	REMOTE CONTROL TRANSMITTER			
CAPACITORS				TRANSISTORS			
△C901	95KUGFZ473BF	0.047μF, 250V Polypro	AG	Q8801	VS2SC1815 / / 1E	LED driver (2SC1815Y)	AB
△C902,	95KUGCQ102AB	1000pF, 2kV, Ceramic	AC	Q8802	VS2SC2120 / / - A	LED driver (2SC2120Y)	AB
△ 903				INTEGRATED CIRCUIT			
△C904	95KUGCQ222AB	2200pF, 2kV, Ceramic	AD	IC8801	RH- i X0478PAZZ	Remote control encoder (LR3714)	AM
△C905	95KUGFZ473BF	0.047μF, 250V, polypro	AG	DIODES AND CRYSTAL			
△C906	95KUGAR101DG	100μF, 450V, Electrolytic	AR	D8801	RH- PX0068PAZZ	LED (GL-521)	AD
△C907	95KUGZ0232ZZ	1μF, 400V, Electrolytic	AD	D8802	RH- PX0129PAZZ	LED (GL-1PR1)	AB
△C908	95KUGZ0461ZZ	22μF, 16V, Electrolytic	AG	CF8801	RFi LF0010PAZZ	Crystal (KBR455BTL)	AE
C911	95KUGAF100BD	10μF, 50V, Electrolytic	AD	MISCELLANEOUS			
C917	95KUGAD272CW	2700μF, 25V, Electrolytic	AK		QTANZ0133PAZZ	Battery terminal (+)	AB
C918	95KUGAD101BU	100μF, 25V, Electrolytic	AC		QTANZ0134PAZZ	Battery terminal (-)	AA
C919	95KUGAC222BU	2200μF, 16V, Electrolytic	AF		QTANZ0135PAZZ	Battery terminal (+, -)	AB
C920	95KUGAC101BU	100μF, 16V, Electrolytic	AC		SSAKH0049PAZZ	Polystyren sack	AA
C921	95KUGAJ220BU	22μF, 100V, Electrolytic	AD	CABINET PARTS			
C922	95KUGAJ1ROBU	1μF, 100V, Electrolytic	AB		DCABA0291AASA	Cabinet A	AN
△C923	95KUGCZ102BC	1000pF, 6kV, Ceramic	AE		GCABB0049AASD	Cabinet B	AE
RESISTORS					GCôVH0048PASB	Battery cover	AB
△R901	95KUEZ0085ZZ	12Mohm, 1/2W, Carbon	AE		MSPRP0210PAZZ	Rubber key	AG
△R902	95KUEGG6R8AS	6.8ohm, 5W, Cement	AE		XYBSF26P08000	Screw	AA
△R903	95KUEFE683AH	68kohm, 2W, Metal oxide	AB		JBTN- 0652PASA	Button, Record	AC
R904	95KUEFD683AY	68kohm, 1W, Metal oxide	AB		JBTN- 0654PASA	Button, Channel	AA
R905	95KUEFD823AX	82kohm, 1W, Metal oxide	AB		JBTN- 0723PASA	Button, Fast-forward/ Rewind	AC
△R908	95KUEFCR39AK	0.39ohm, 1/2W, Metal oxide	AA		JBTN- 0722PASA	Button, Pause/Still	AC
△R911	95KUEZ0033ZZ	8.2ohm, 1/2W, Carbon	AD		JBTN- 0721PASA	Button, Stop/Play	AC
△R914	95KUEFC150AM	150ohm, 1/2W, Metal oxide	AB		JBTN- 0677PASA	Button, Slow	AC
R915	95KUEFE152AX	1.5kohm, 2W, Metal oxide	AB		JBTN- 0651PASA	Button, Power	AC
R916	95KUEFC2R7AP	2.7kohm, 1/2W, Metal oxide	AB		JBTN- 0676PASA	Button, Slow (+), (-)	AA
COILS AND TRANSFORMER					JBTN- 0724PASA	Button, Frame advance	AC
△L901	95KUKZ0112ZZ	Line filter	AL				
L902	95KUZZ0030ZZ	100 μH	AC				
L903	95KUKZ0052ZZ	Choke	AG				
L904	95KUKZ0050ZZ	Choke	AF				
△L905	95K129030027	Choke	AL				
△T901	95K129030080	Power transformer	AV				
MISCELLANEOUS							
△F901	95KPJC0413ZZ	Fuse T3A, 250V	AF				
△F902	95KPJC0272ZZ	Fuse T3A, 125V	AF				
△F903	95KPJC0299ZZ	Fuse T6, 3A, 125V	AG				
△F904	95KPJT0085ZZ	Fuse 130° C	AE				
△ICP901	95KPJC0282ZZ	Protector (SSFR 1A, 125V)	AG				
△FB901	95KBFZ89135Z	Ferrite bees	AB				
△ 902,							
△ 903,							
△ 904							
△	QACCD3013GEZZ	AC cord	AL				
△PA	95KPKZ0194ZZ	Plug (3 pin)	AC				
PB	95KPKZ0446ZZ	Plug (6 pin)	AC				
PC	95KPKZ0442ZZ	Plug (2 pin)	AB				
PD	95KECD0200ZZ	Housing	AP				

EXPLODED VIEWS AND PARTS LISTS

MECHANICAL PARTS

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
1	GCABB1050GEKA	Cabinet	AS	10	QEARP0173GEFW	Earth plate	AC
3	TLABM1397GEZZ	Model label	AB	12	PFLT-0006GEZZ	Felt	AB
4	CHLDZ1563GE01	Holder, Tuner	AD	13	MHNG-1032GEZZ	Hinge	AB
4-1	LHLDZ1563GEZZ	Holder	AD	14	LX-LZ1001GEZZ	Push rivet	AA
4-2	LHLDF1070GEZZ	Holder	AD	15	LHLDZ1540GEZZ	Fluorescent tube holder	AC
5	CCöVA1422GEK1	Antenna cover ass'y	AF	17	LHLDP1012GE08	Holder, LED	AC
5-1	GCöVA1422GEKZ	Antenna cover	AD	18	PSPAZ0046GEZZ	Spacer	AA
5-2	HiNDP1205GEZZ	Indication plate, Antenna	AD	19	MHNG-1042GEZZ	Hinge	AB
6	XEASD30P12000	Screw	AA	20	LHLDZ1565GEZZ	Holder	AB
7	XEASD40P16000	Screw	AA	21	LHLDZ1564GEZZ	Holder	AB
8	XHPSD30P06WS0	Screw	AA	22	LHLDP1065GEZZ	Holder	AD
9	QEARP0165GEFW	Earth plate	AB	23	LANGF9269GEFW	Angle	AE

CABINET PARTS

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
1	GCABA3021GESI	Top cabinet	AS	5-10	MSPRC0100GEFJ	Spring	AA
2	LX- HZ3030GEFN	Screw	AA	5-11	HDECQ0405GESA	Indication plate, Front panel	AT
3	GBDYU3046GEZZ	Bottom plate	AH	5-12	Hi NDP1172GESA	Indication plate, Door	AG
4	XEASD30P12000	Screw	AA	5-13		Door ass'y	-
5	CPNLC1425GEK3	Front panel ass'y	BF	5-13-1	LANGF9284GE00	Fixing metal, for door	AF
5-1	CBTN- 1977GE04	Operate (Power)/	AG	5-13-2	GDÖRF1405GESA	Door	AL
		Eject button ass'y		5-13-3	HBDGB3007GESA	Badge, "SHARP"	AD
5-2	CBTN- 1978GE01	Operation button ass'y (REW, PLAY, STOP, FF, PAUSE/STILL)	AF	5-14	PC6VU9105GEZZ	Cover, Remote control receiver	AC
5-2-1	JBTN- 1960GESA	Button, Record	AD	5-15	Hi NDP0993GESA	Indication plate, V/S	AE
5-2-2	JBTN- 1978GESA	Button, Rewind/Play/Stop/FF/Pause-Still	AC	6	Hi NDP1173GEZZ	System indication plate	AD
5-3	JBTN- 2071GESA	Button, Timer setting	AE	7	XEBSD30P12000	Screw	AA
5-4	JBTN- 2029GESA	Button, Tuning	AE	8	GC6VH1004GESA	Tuning button cover	AG
5-6	LHLDZ1509GEZZ	Magnet	AD	9	TLABZ0148GEZZ	POS label	AB
5-7	GC6VA1358GESA	Button cover	AC	10	TLABH0314GEZZ	Door label	AA
5-8	JBTN- 1822GESA	Button, Counter	AD	12	HiNDP1170GESA	Seat	AC
5-9	JBTN- 1931GESA	Button, Channel	AD				

CABINET PARTS DIAGRAM

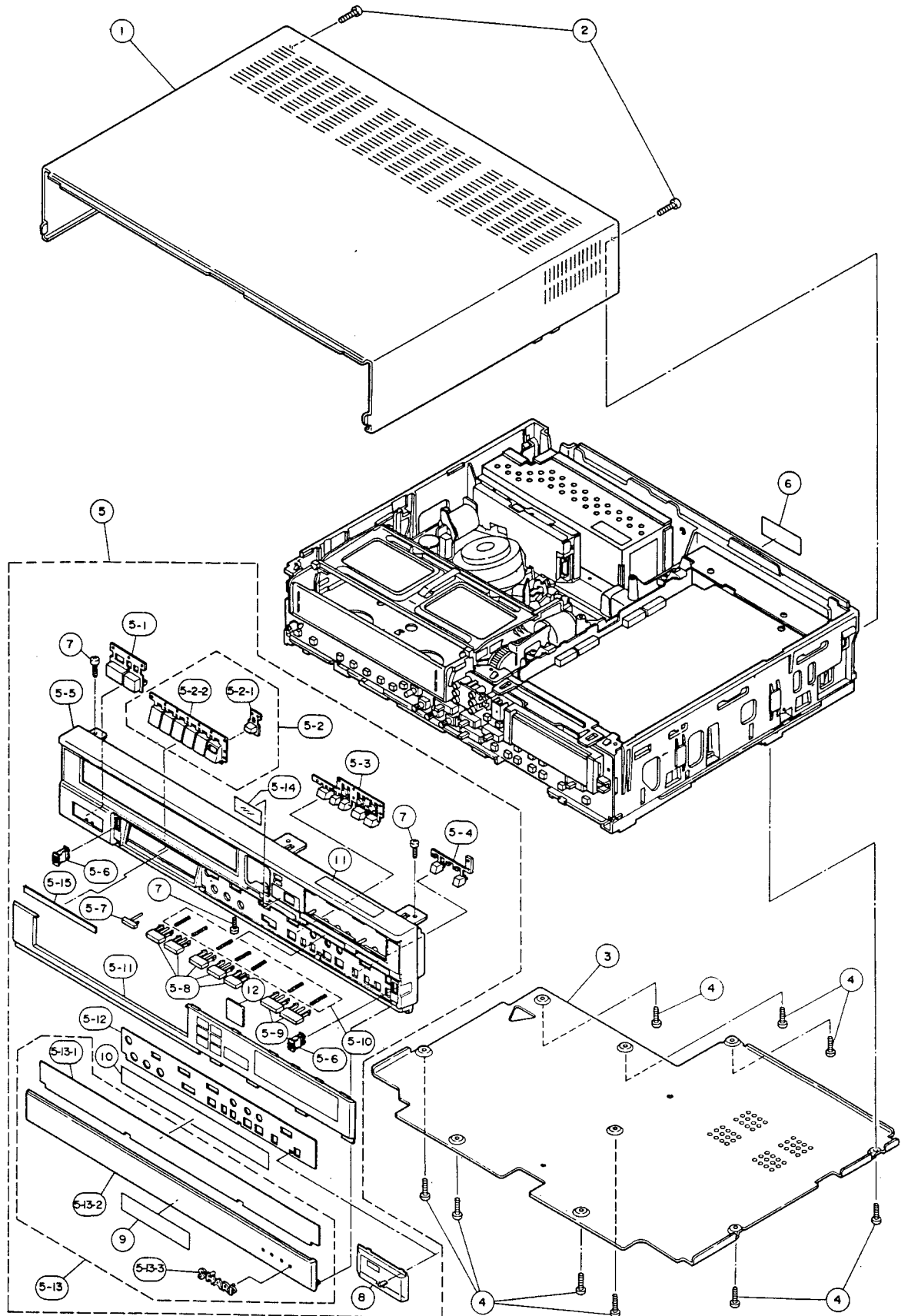


Figure 5-2.

MECHANISM CHASSIS PARTS

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
1	RH- PX0090GE01	LED sensor	AH	72	PGi DC0025GEFW	V block (B) ass'y	AE
3	DDRMU0004HE14	Upper drum ass'y	BQ	73	PGi DP0015GEFW	Retaining guide	AC
4	PGi DC0031GEFW	V base	AM	75	PGi DS0005GEZZ	Supply impedance flange	AE
5	LANGF9264GEZZ	Pinch roller relay plate ass'y	AK	78	QBRSK0017GEZZ	Earth brush ass'y	AD
				80	QPLGN0229TAZZ	Plug, 2pin (NL) (Reel sensor PWB)	AB
6	DDRML0008HE00	Lower drum ass'y	BK				
7	LANGF9255GEZZ	Mechanism control angle	AL	81	QPLGN0280GEZZ	Plug, 2pin (NF) (Loading motor PWB)	AB
10	LANGT9100GEFW	Dew sensor angle	AB			Plug, 2pin (NB) (Dew sensor PWB)	
11	LBNDK1001GEZZ	Tension band ass'y	AH			Plug, 2pin (NE) (Mechanism relay PWB)	AA
12		Main chassis	-	82	QPLGN0278GEZZ	Plug, 8pin (NT, NA)	AC
13	LCHSS0011GEZZ	Guide plate ass'y	AG			Dew sensor PWB	-
14	LDAi H3013GEZZ	Audio/Control head plate	AD	84	QPLGN0880GEZZ	Reel sensor PWB	-
15	LHLDZ1435GEZZ	Loading motor holder	AC	87	QPWBF2350GEZZ	Loading motor PWB	-
17	LHLDP1045GEZZ	Cassette LED holder	AE	88	QPWBF2201GEZZ	Full erase head PWB	-
18	LPôLM0022GEZZ	Pole base A ass'y	AM	89	QPWBF2045GEZZ	Shifter switch (Reel sensor PWB)	AD
19	LPôLM0023GEZZ	Pole base B ass'y	AM	90	QPWBF2356GEZZ	Cam switch	AM
20	MARMM0052GEZZ	Loading arm A ass'y	AE	91	QSW- F0024GEZZ	Dew sensor	AG
21	MARMM0053GEZZ	Loading arm B ass'y	AE			Cassette LED	AG
22	MARMM0054GEZZ	Tension arm ass'y	AE	96	RHEDT0019GEZZ	Full erase head ass'y	AP
23	MARMP0035GEZZ	Full erase head arm	AB	97	RHEDU0057GEZZ	Audio/Control head ass'y	AU
24	MLEVF0229GEZZ	Pinch roller lever ass'y	AH	98	RHETP0015GEZZ	Heater ass'y	AG
25	MLEVF0225GEZZ	Brake drive lever ass'y	AF	99	RMôTM1042GEZZ	Loading motor	AM
27	MLEVP0083GEZZ	Auxiliary brake lever	AA	100	RMôTP1081GEZZ	Direct drive motor ass'y	BB
28	MLEVP0084GEZZ	Torque change lever	AA	101	RMôTN2004GEZZ	Capstan D.D. motor	BE
29	MLEVP0085GEZZ	Take-up brake lever	AC	102	RPLU- 0075GEZZ	Brake solenoid	AG
30	MLEVP0086GEZZ	Supply brake lever	AC	104	VCKYAT1HD102M	1000pF, 20%, 50V (C8001, 8002)	AA
31	MLEVP0087GEZZ	Tension adjusting lever	AC			(Reel sensor PWB)	
32	MLEVP0088GEZZ	Tension release lever	AC	105	VRD- RA2EE473J	47k ohm, 5%, 1/4W, carbon (R8002, 8004)	AA
33	MSLi F0023GEZZ	Shifter ass'y (A)	AE			(Reel sensor PWB)	
34	MSLi F0024GEZZ	Shifter ass'y (B)	AD	106	VRD- RA2EE222J	2.2k ohm, 5%, 1/4W, carbon (R8007)	AA
35	MSPRC0006GEFJ	Audio/Control head spring	AA			(Reel sensor PWB)	
37	MSPRC0084GEFJ	Audio/Control head arm spring	AA	107	VRD- RA2EE221J	220 ohm, 5%, 1/4W, carbon (R8001, 8003)	AA
						(Reel sensor PWB)	
39	MSPRC0086GEFJ	Brake lock spring	AA	108	LX- NZ3019GEZZ	Adjusting nut	AB
40	MSPRT0216GEFJ	Pinch pressure spring	AB	109	MLEVF0227GEZZ	Reverse guide lever	AC
41	MSPRT0217GEFJ	Full erase head arm spring	AA	110	MSPRC0088GEFJ	Reverse guide spring	AA
42	MSPRT0218GEFJ	Tension arm spring	AA	112	MLEVP0101GEZZ	Universal brake lever	AB
43	MSPRT0241GEFJ	Auxiliary brake spring	AA	114	MSPRT0240GEFJ	Universal brake spring	AA
44	MSPRT0220GEFJ	Loading gear reciprocating spring	AA	115	PSPAF0021GEZZ	Supply impedance roller spacer	AD
45	MSPRT0221GEFJ	Main brake spring	AA				
48	NBLTK0039GE00	Loading belt	AB	116	VRD- RA2EE122J	1.2k ohm, 5%, 1/4W, carbon (R8008)	AA
51	NDAi V1032GEZZ	Supply reel disk ass'y	AF	117	VRD- RA2EE152J	1.5k ohm, 5%, 1/4W, carbon (R8009)	AA
52	NDAi V1038GEZZ	Take-up reel disk ass'y	AF			D.D. brake solenoid	AK
54	NGERH1072GEZZ	Relay gear (B)	AB	120	RPLU- 0080GEZZ	D.D. brake lever ass'y	AB
55	NGERH1091GEZZ	Brake cam	AC	121	MLEVP0102GEZZ	D.D. brake mounting plate	AD
56	NGERH1090GEZZ	Master cam	AC	122	LANGF9290GEZZ	Release spring	AA
57	NGERH1075GEZZ	Loading gear (A) ass'y	AD	123	MSPRC0116GEFJ	D.D. brake lever spring	AA
58	NGERH1076GEZZ	Loading gear (B) ass'y	AC	124	MSPRT0239GEFJ	Spacer	AC
59	NGERH3032GEZZ	Segment gear ass'y	AE	125	PSPAB0019GEFW	Segment gear roller	AA
61	NPLYV0036GEZZ	Loading motor pulley	AB	126	NRôLM0016GEFW		
63	NPLYV0102GEZZ	Loading block ass'y	AL				
64	NPLYV0111GEZZ	Reel drive unit	AR				
65	NRôLP0046GEZZ	Supply impedance roller	AH				
66	NRôLP0047GEZZ	Guide roller ass'y	AH				
67	NRôLR0013GEZZ	Pinch roller ass'y	AN				
68	NSFTL0215GEFW	Supply impedance sub shaft	AB				
69	NSFTZ0026GEFD	Brake lock shaft	AA				
71	PGi DC0024GEFW	V block (A) ass'y	AE				

MECHANISM CHASSIS PARTS DIAGRAM

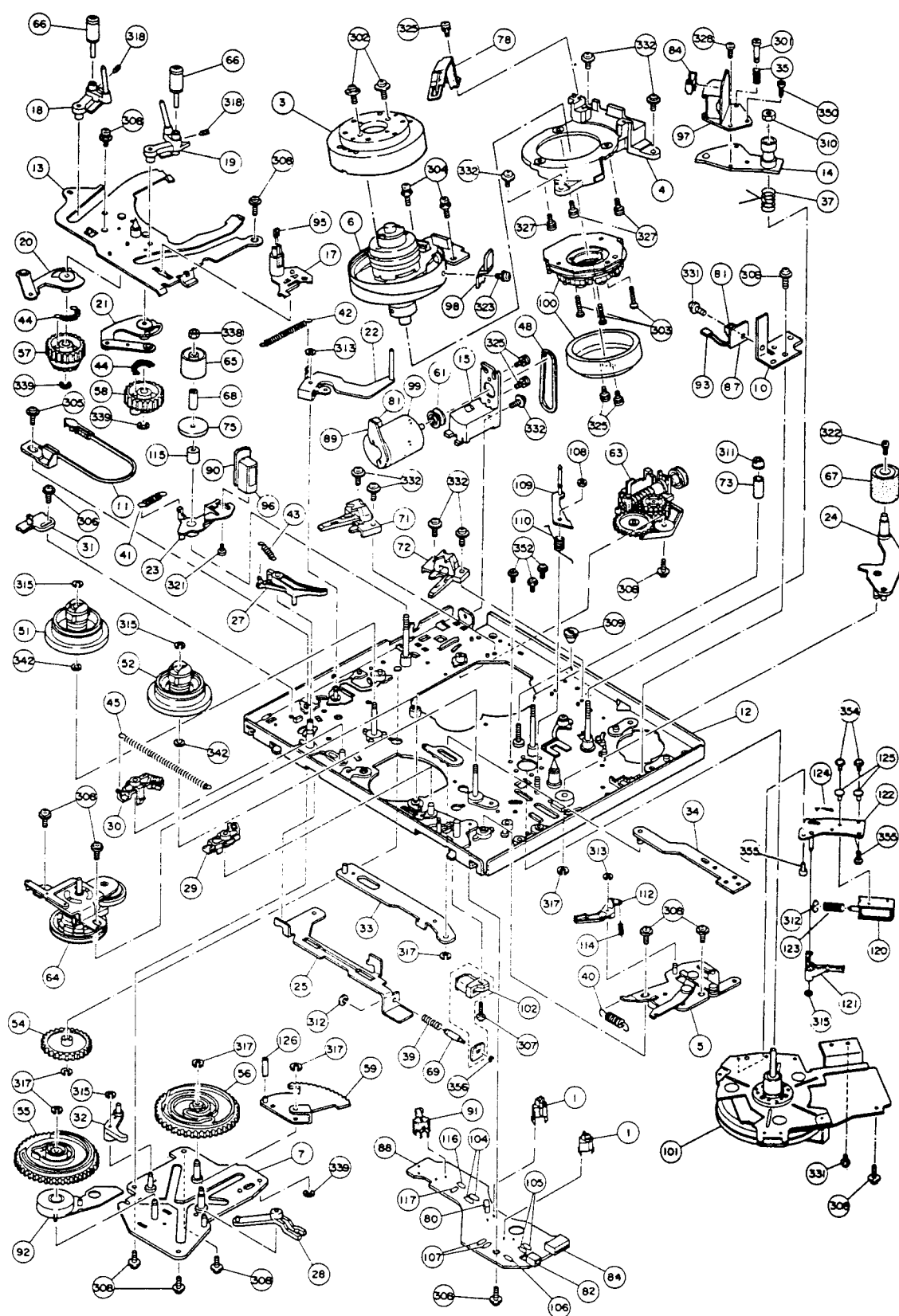


Figure 5-3.

CASSETTE HOUSING CONTROL PARTS

REF.NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
1	HDECQ0329GES A	Cassette cover	AH	21	NPLYV0100GEZZ	Motor pulley	AA
2	LANGF9251GEFW	Top plate	AG	22	NSFTL0442GEFD	Main shaft	AD
3	LANGF9305GEZZ	Motor angle ass'y	AC	23	PGi DM0042GE00	Down guide	AF
4	LHL DX1005GE00	Frame (right)	AK	24	PGUMM0028GEZZ	Worm anti-vibration rubber	AB
5	LHL DX1006GE00	Frame (left)	AH	26	QPL GN0980GEZZ	Plug (9 pin)	AC
6	LHL DX3029GEZZ	Slider ass'y	AL	27	QPWBF2140GEZZ	Relay P.W.B.	—
6-1	LHL DX1003GE00	Holder (right)	AG	28	QPWBF1553GEZZ	End sensor P.W.B.	—
6-2	LHL DX1004GE00	Holder (left)	AG	29	QSW- F0021GEZZ	Cassette switch	AD
6-3	LHL DX3029GEFW	Slider	AE	30	QSW- F0022GEZZ	Mode switch	AE
6-4	MARMP0028GEZZ	Lock release lever ass'y	AD	31	QSW- F0023GEZZ	Mistaken erasure prevention switch	AD
6-5	MSPRP0097GEFJ	Cassette spring	AA				
7	MARMM0051GEFW	Drive washer	AB	32	VRD- RA2BE222J	Resistor (2.2k ohm)	AA
8	MARMP0029GEZZ	Drive arm (right)	AB	33	RH- PX0053GEZZ	Photo-transistor	AF
9	MARMP0030GEZZ	Drive arm (left)	AB	34	RM6 TM1040GEZZ	Cassette motor	AN
10	MARMP0031GEZZ	Cassette cover arm	AA	35	MSPRD0068GEFJ	Cassette cover spring	AA
11	ML EVP0080GEZZ	Timing lever	AA	36	VRD- RA2EE153J	Resistor (15k ohm)	AA
12	ML EVP0081GEZZ	Cover open lever	AB	37	VS2SA937- Q/ - 1	Transistor	AC
13	MSPRD0065GEFJ	Drive reciprocating spring	AA	38	VCTYP A1EX473M	Capacitor (0.047 μ F)	AA
14	MSPRB0066GEFJ	Open lever spring	AA	39	VRD- RA2EE223J	Resistor (22k ohm)	AA
15	MSPRT0215GEFJ	Drive spring	AA	40	VRD- RA2BE272J	Resistor (2.7k ohm)	AA
16	NGERH1069GEZZ	Drive gear (right)	AC	41	LX- HZ3037GEFD	Screw	AA
17	NGERH1070GEZZ	Drive gear (left)	AB		CHL DX3035GE99	Cassette housing ass'y	BB
18	NGERH1071GEZZ	Phase gear	AA			(Note that ref.No.1	
19	NGERW1018GEZZ	Worm gear	AB			"Cassette cover" is not	
20	NGERW1019GEZZ	Worm wheel gear	AB			shipped together.)	

CASSETTE HOUSING CONTROL PARTS DIAGRAM

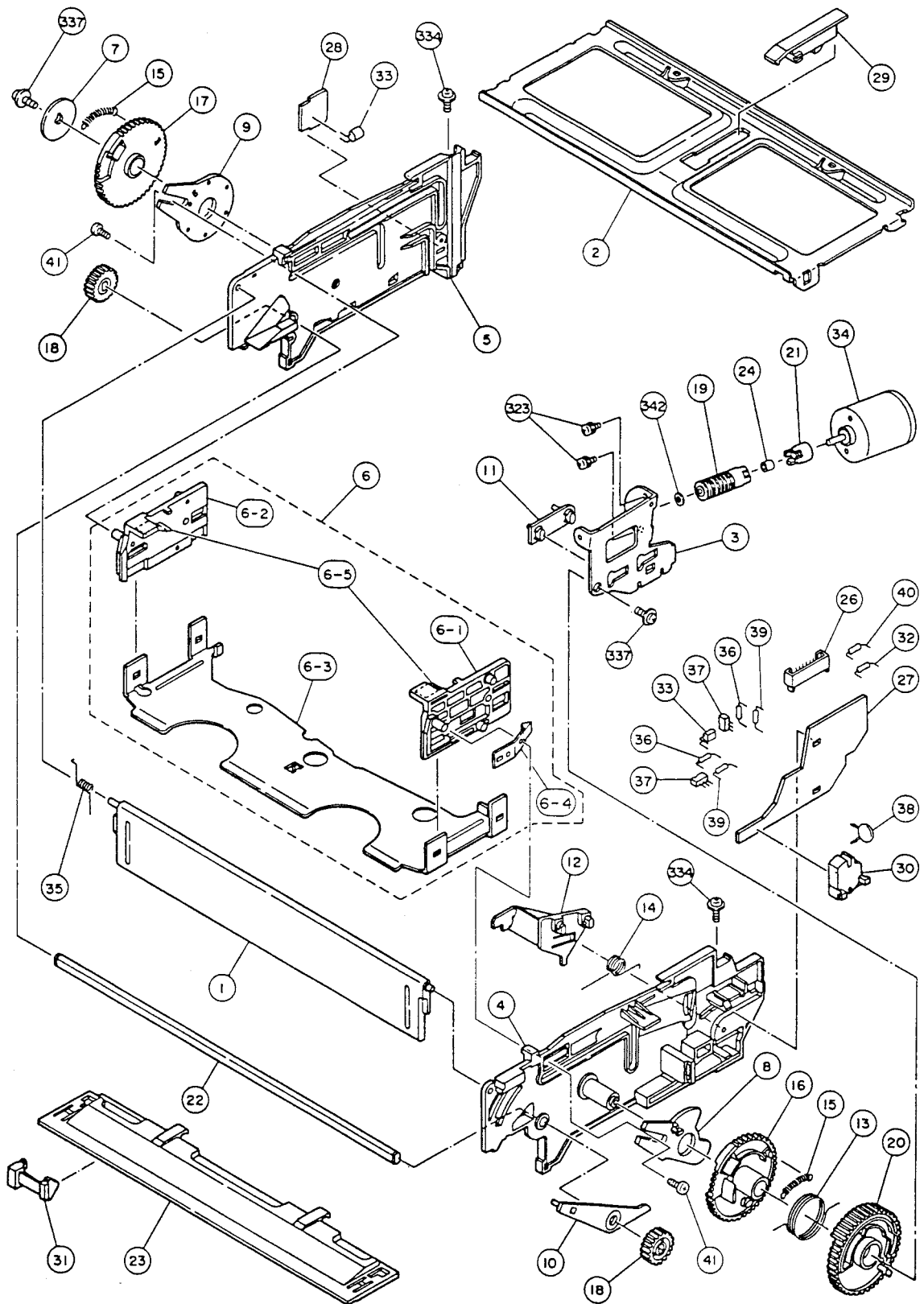


Figure 5-4.

SCREW, NUTS, WASHERS, AND WIRE CLAMP

REF. NO.	PART NO.	DESCRIPTION	SIZE	CODE	REF. NO.	PART NO.	DESCRIPTION	SIZE	CODE
301	LX-BZ3018GEZZ	AC head screw		AA	325	XBPSD30P05J00	Screw	SW3P+5S	AA
302	LX-BZ3039GEFN	Screw	W3P+9S-Ni	AA	327	XBPSD30P08J00	Screw	SW3P+8S	AA
303	XBPSD26P14J00	Screw	SW2.6P+14S	AA	328	XBPSD30P08000	Screw	3P+8S	AA
304	LX-BZ3049GEFD	Screw	WSW3P+10S	AA	331	XHPDSD30P06WS0	Screw	C3P+6S	AA
305	LX-HZ3002GEFD	Screw	3x8	AA	332	XHPDSD30P08WS0	Screw	C3P+8S	AA
306	LX-HZ3008GEFD	Screw	S3P+8S-W	AA	334	XHPS330P06WS0	Screw	C3P+6S (Red)	AA
307	LX-HZ3026GEFD	Screw	2x8	AA	337	XJPSD30P06WS0	Screw	C3P+6S	AA
308	LX-HZ3027GEFD	Screw	3x8	AA	338	LX-NZ3033GEFD	Nut		AA
309	LX-NZ3013GEFW	Nut		AA	339	XRESJ30-06000	E ring	E ring-3	AA
310	LX-NZ3031GEFW	Nut		AA	342	XWHJZ31-05054	Washer	3.1W-5.4-0.5	AA
311	LX-NZ3016GEFD	Nut		AB		XWHJZ31-01054	Washer	3.1W-5.4-0.13	AA
312	LX-WZ1001GE00	Washer	3.2W-8-0.5	AA		LX-WZ1017GE00	Washer	3.1W-5.4-0.2	AA
313	LX-WZ1003GE00	Washer	2.1W-5-0.5	AA		LX-WZ1018GE00	Washer	3.1W-5.4-0.3	AA
315	LX-WZ1006GE00	Washer	2.6W-5.4-0.5	AA	350	LX-WZ1019GE00	Washer	3.1W-5.4-0.4	AA
317	LX-WZ1015GE00	Washer	3.6W-7.2-0.5	AA	352	LX-BZ3065GEFD	Screw		AA
318	LX-XZ3001GEFP	Fixing screw	M2x3	AC	354	LX-HZ3036GEFD	Screw	C2.6P+5.5S	AA
321	XBPSD20P03000	Screw	2P+3S	AA	355	XBPSD20P05J00	Screw	SW2P+5S	AA
322	XBPSD26P04J00	Screw	SW2.6P+4S	AA	356	XHPDSD26P04000	Screw	2.6P+4S	AA
323	XBPSD30P04J00	Screw	SW3P+4S	AA		XRESJ12P03000	E ring	E ring-1.2-T0.3	AA

PACKING OF THE SET

■ Setting positions of the knobs

Test signal switch	at "OFF" Position	Tracking knob	at "center click" Position
Picture tone	at "center" Position	Auto mode switch	at "Auto" Position
Channel selector	at "Normal" Position		

